US009551170B1

(12) **United States Patent**
**Kovac**

(10) **Patent No.: US 9,551,170 B1**
(45) **Date of Patent: Jan. 24, 2017**

(54) **HANDCUFF APPARATUS**

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(73) Assignee: **Creative Law Enforcement Resources, Inc.**, South Pasadena, CA (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/919,200**

(22) Filed: **Oct. 21, 2015**

(51) **Int. Cl.**
***E05B 75/00*** (2006.01)
***E05B 35/00*** (2006.01)
***E05B 27/00*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***E05B 75/00*** (2013.01); ***E05B 27/0003*** (2013.01); ***E05B 35/008*** (2013.01)

(58) **Field of Classification Search**
CPC ..... E05B 75/00
See application file for complete search history.

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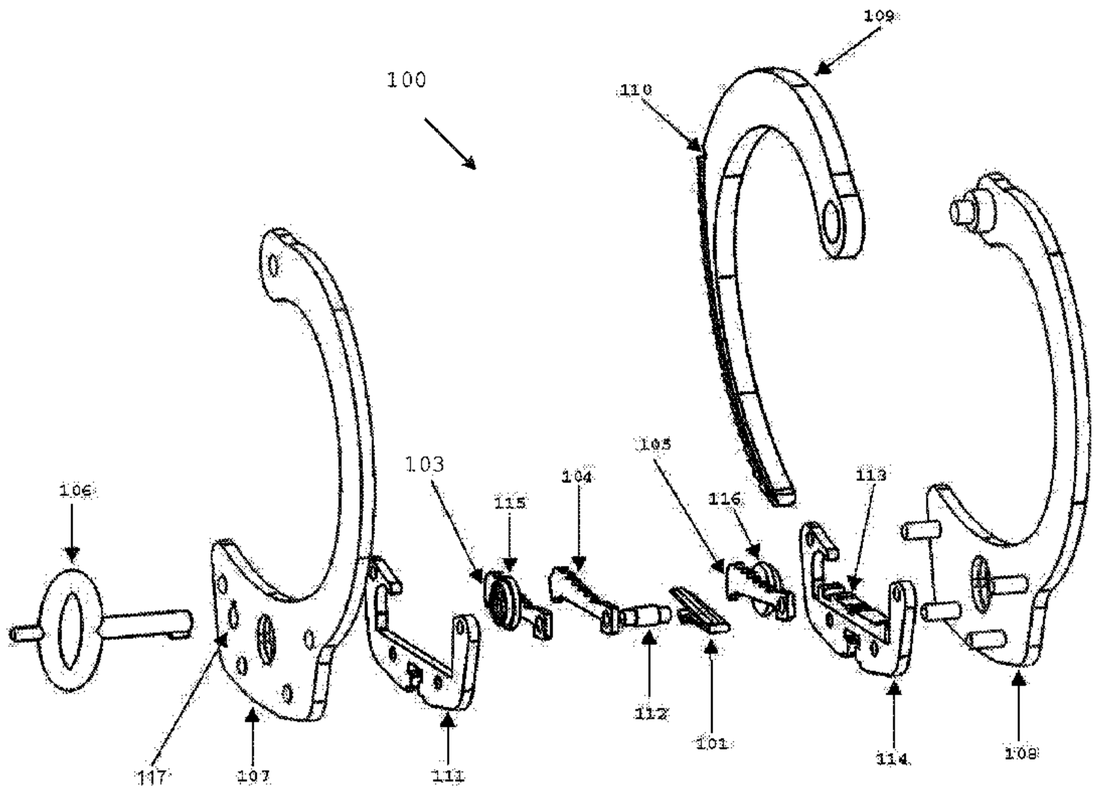
*Primary Examiner* — Christopher Boswell
(74) *Attorney, Agent, or Firm* — Smyrski Law Group, A P.C.

(57) **ABSTRACT**

A set of handcuffs utilizing a conventional single strand and double strand system with ratchet teeth to prevent opening by virtue of one or more pawls is provided. The handcuffs may be connected via chain or similar device. Standard handcuffs may be unlocked by use of a universal key thereby creating safety and security issues. This design incorporates secondary security features which require that a handcuff be manipulated in some additional manner simultaneously while a handcuff key is utilized. This system requires two sets of hands to be used simultaneously to disengage the locking system. One hand of a person wearing the handcuffs is unable to manipulate the handcuff on which it is worn. As a result, it is virtually impossible for the wearer of the handcuffs to unlock the handcuffs/restraining device even if the person is in possession of the required key.

**30 Claims, 85 Drawing Sheets**



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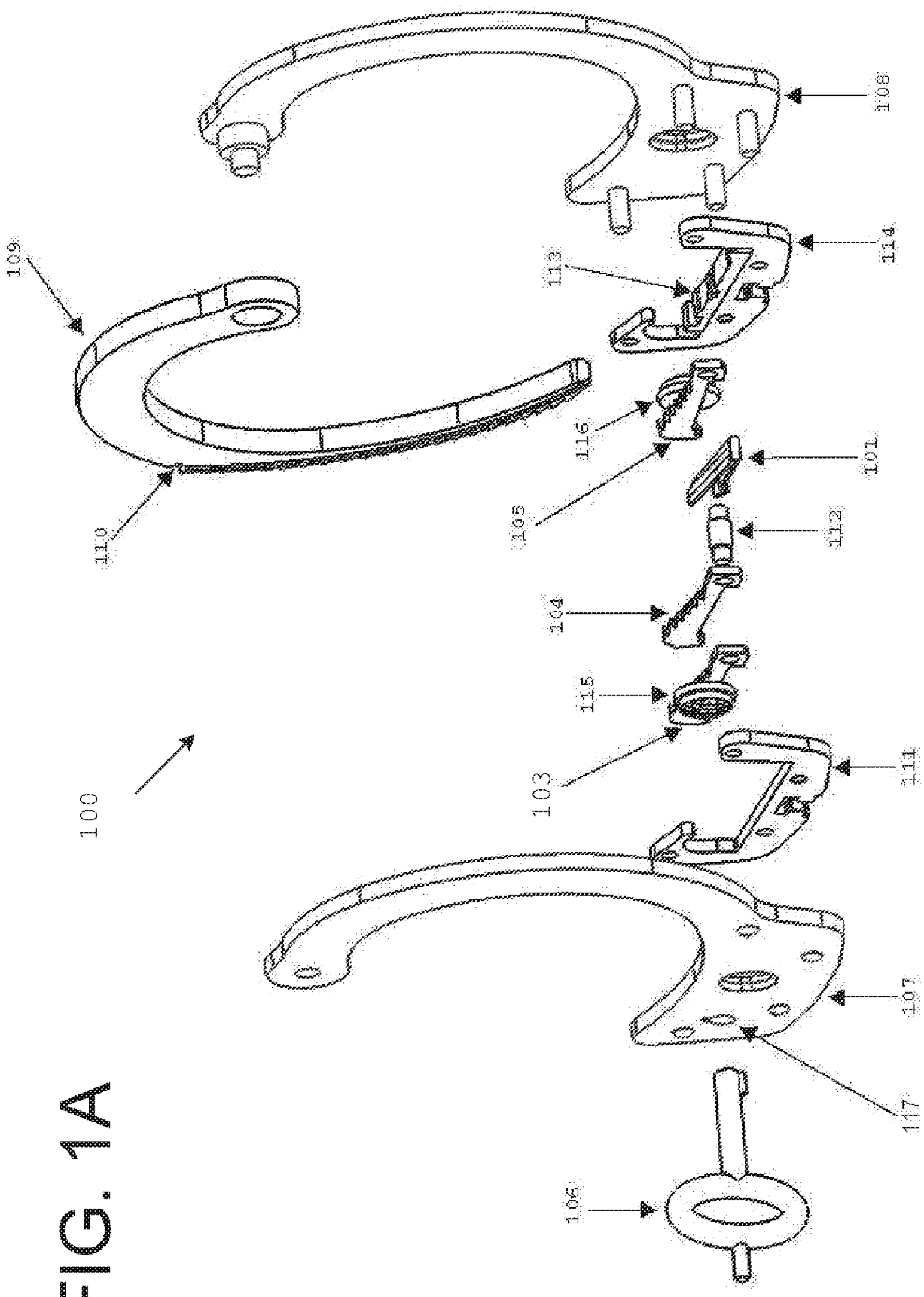
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FIG. 1A

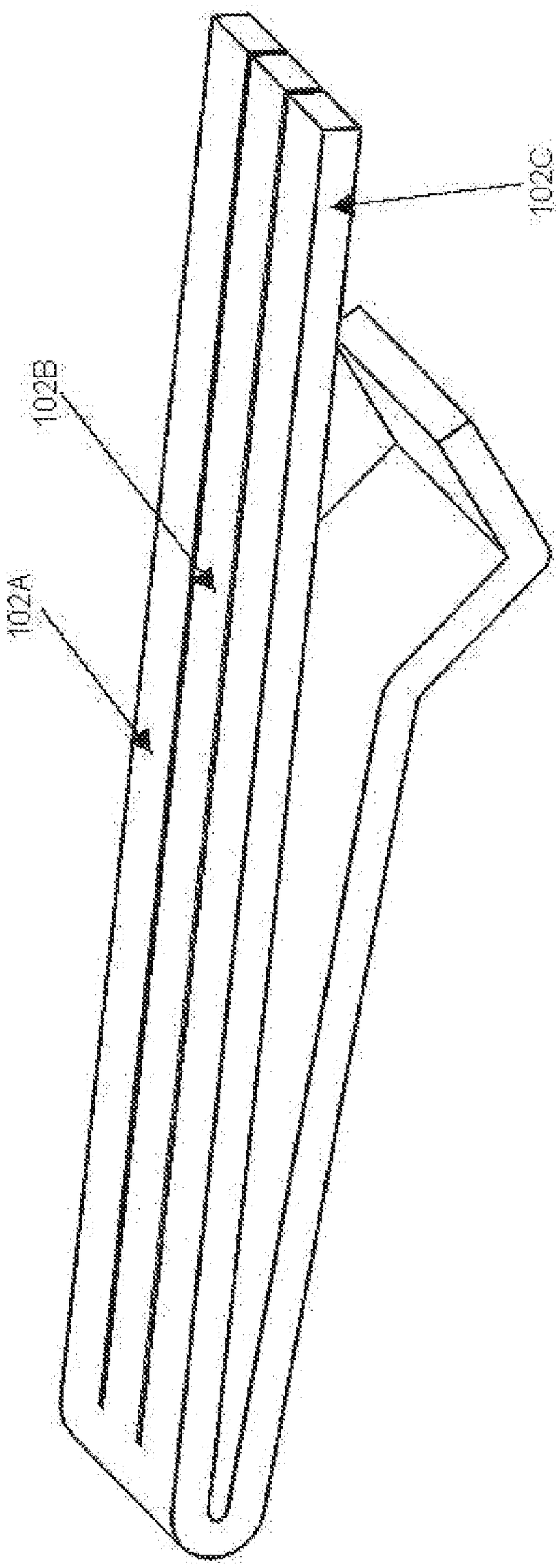


FIG. 1B

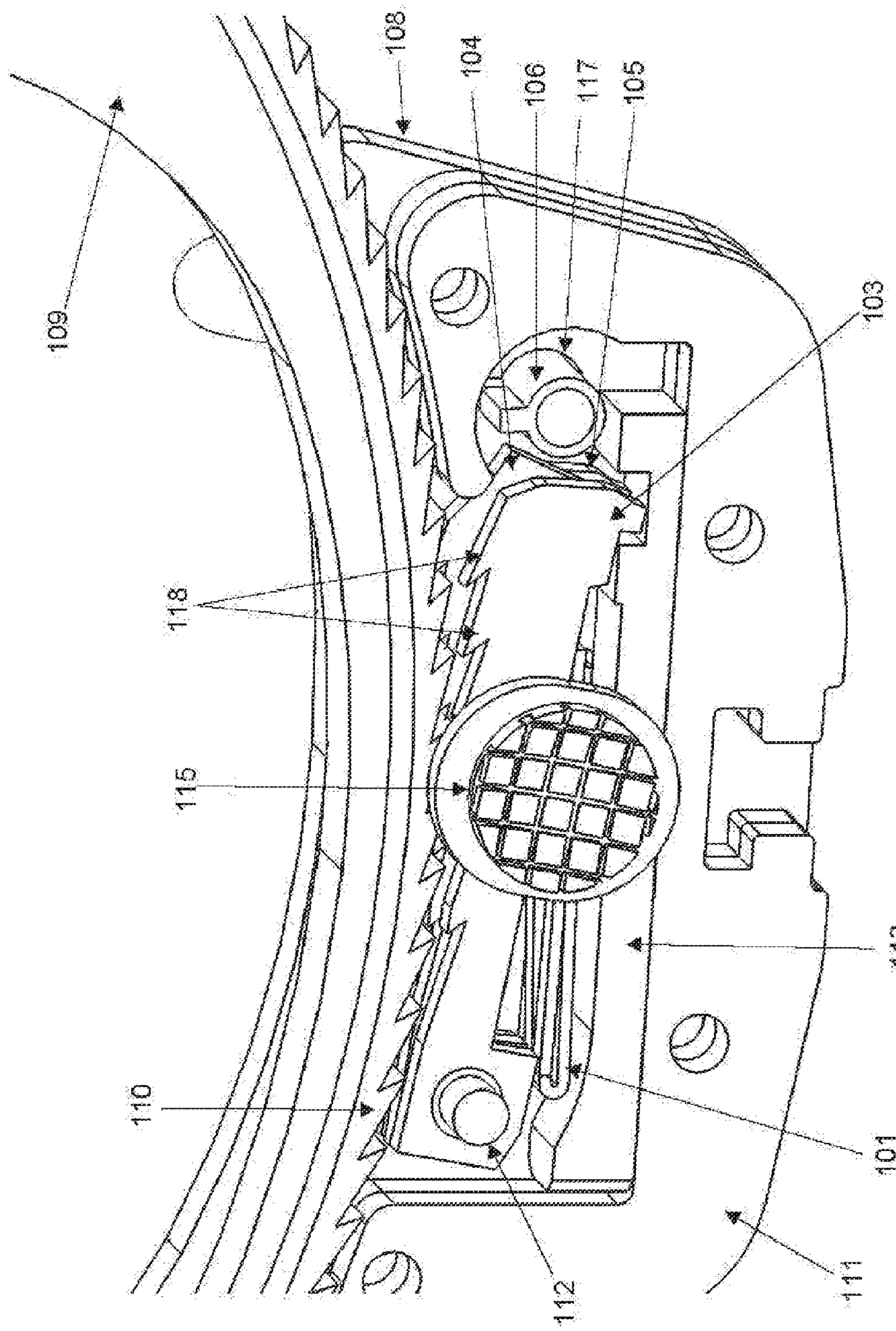


FIG. 1C

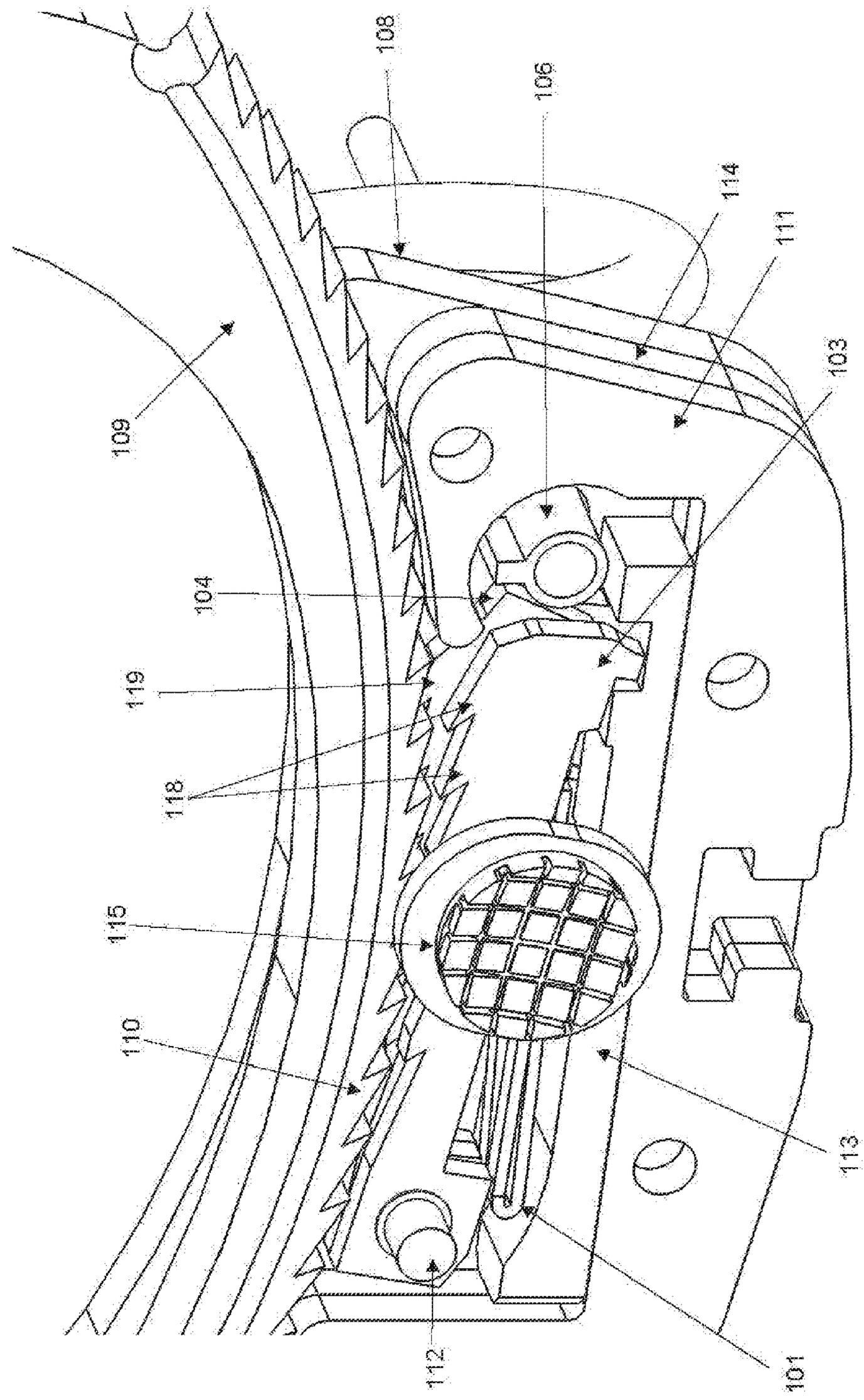


FIG. 1D

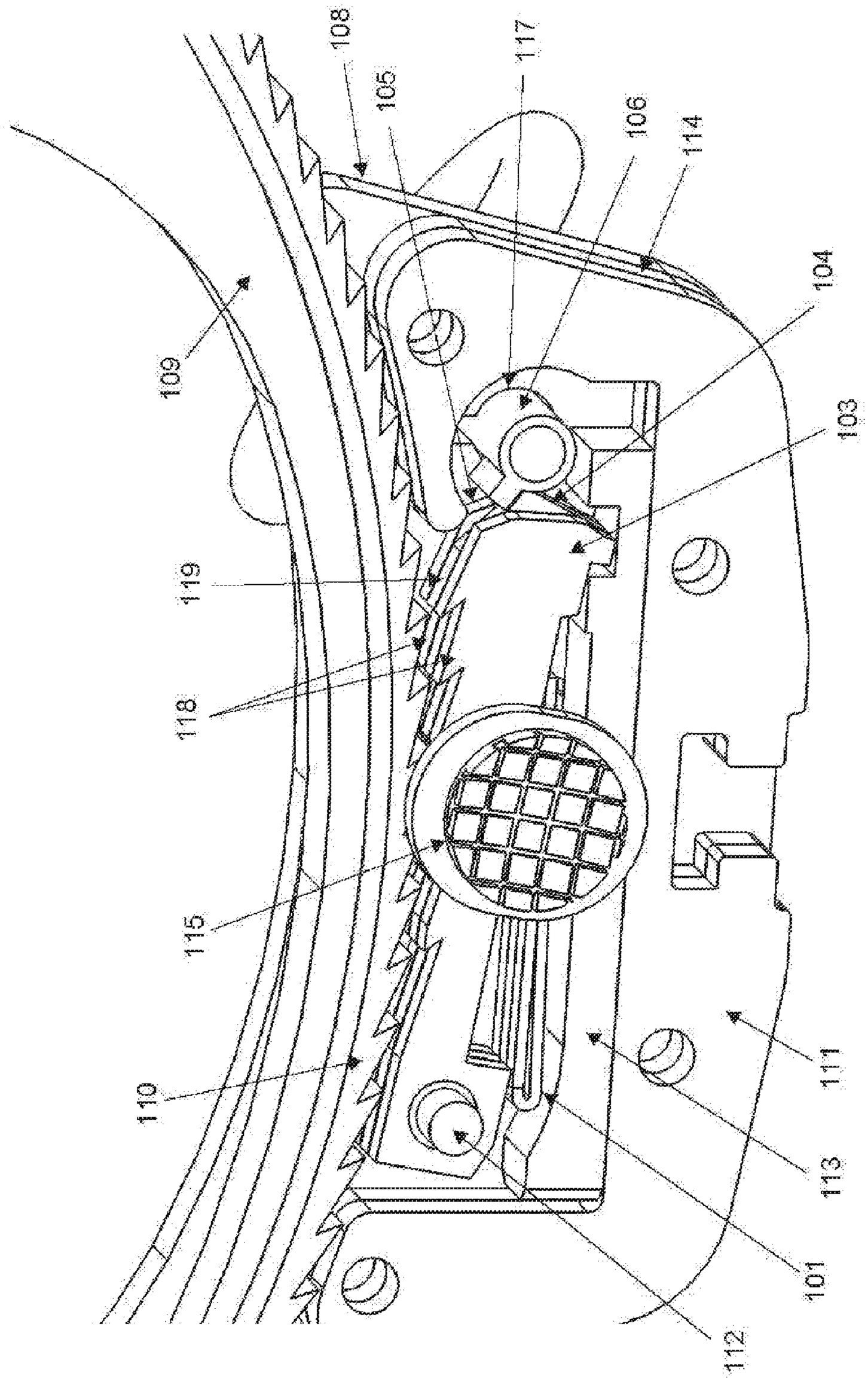


FIG. 1E

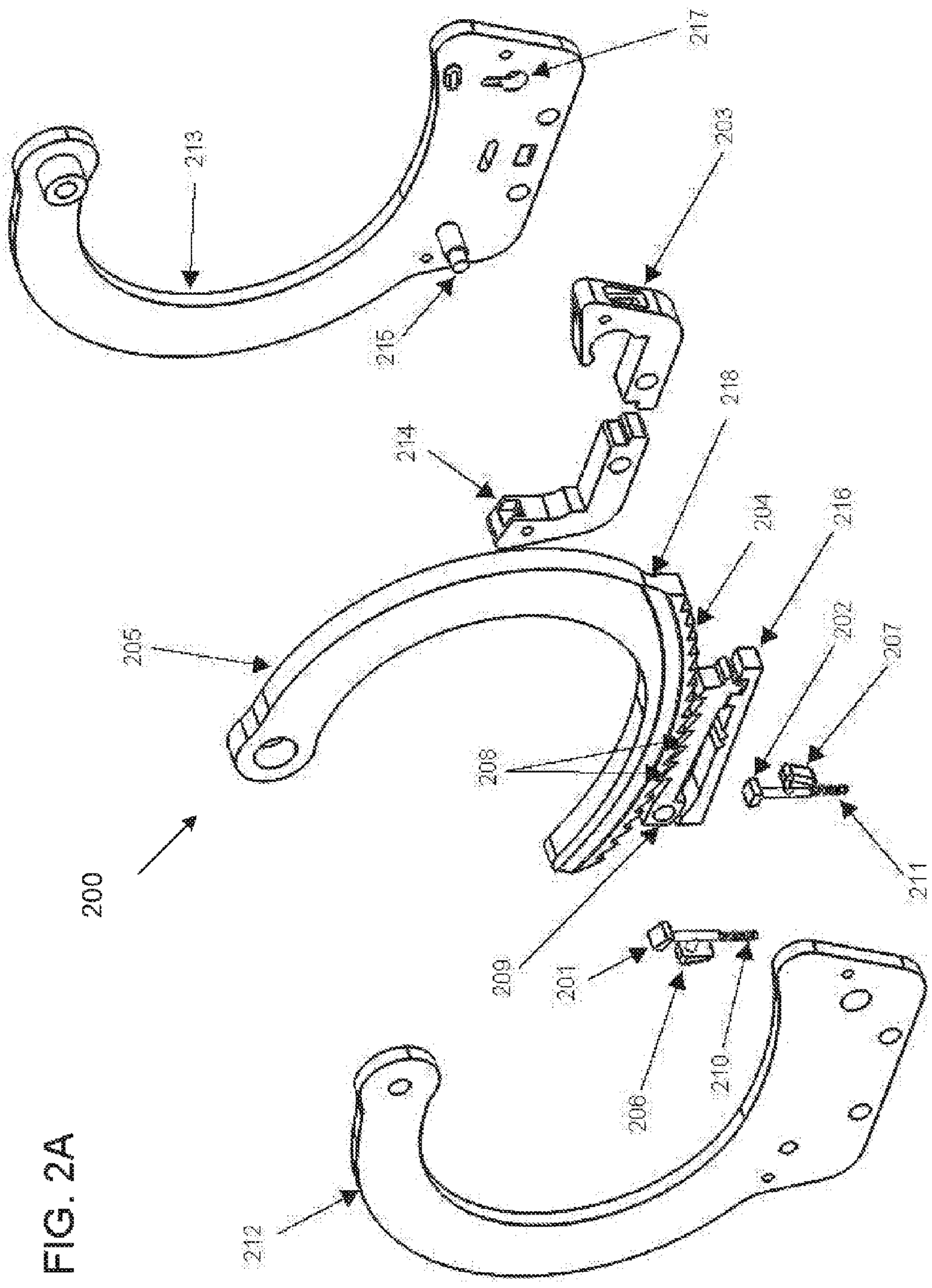
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FIG. 2A

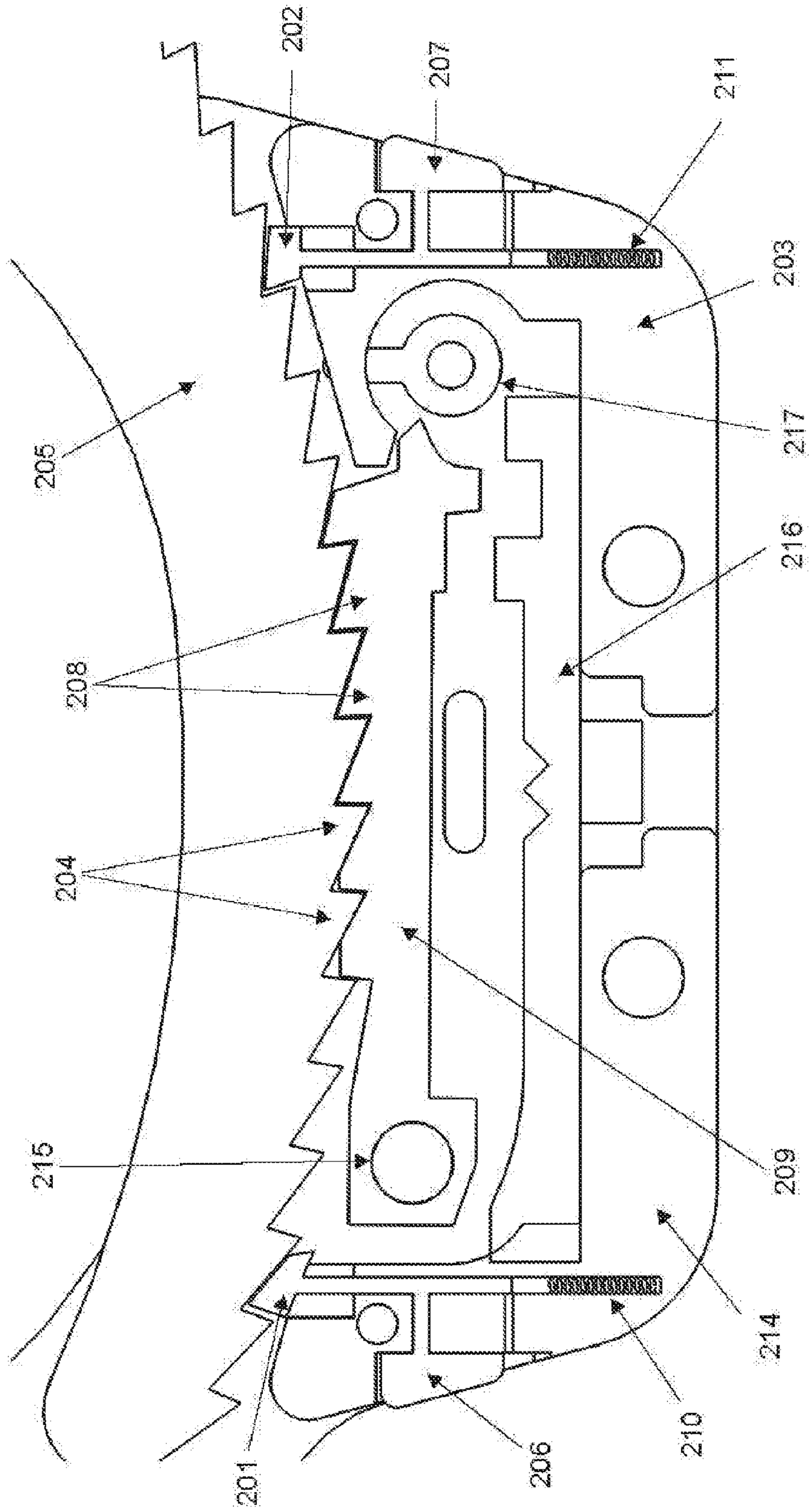



FIG. 2B

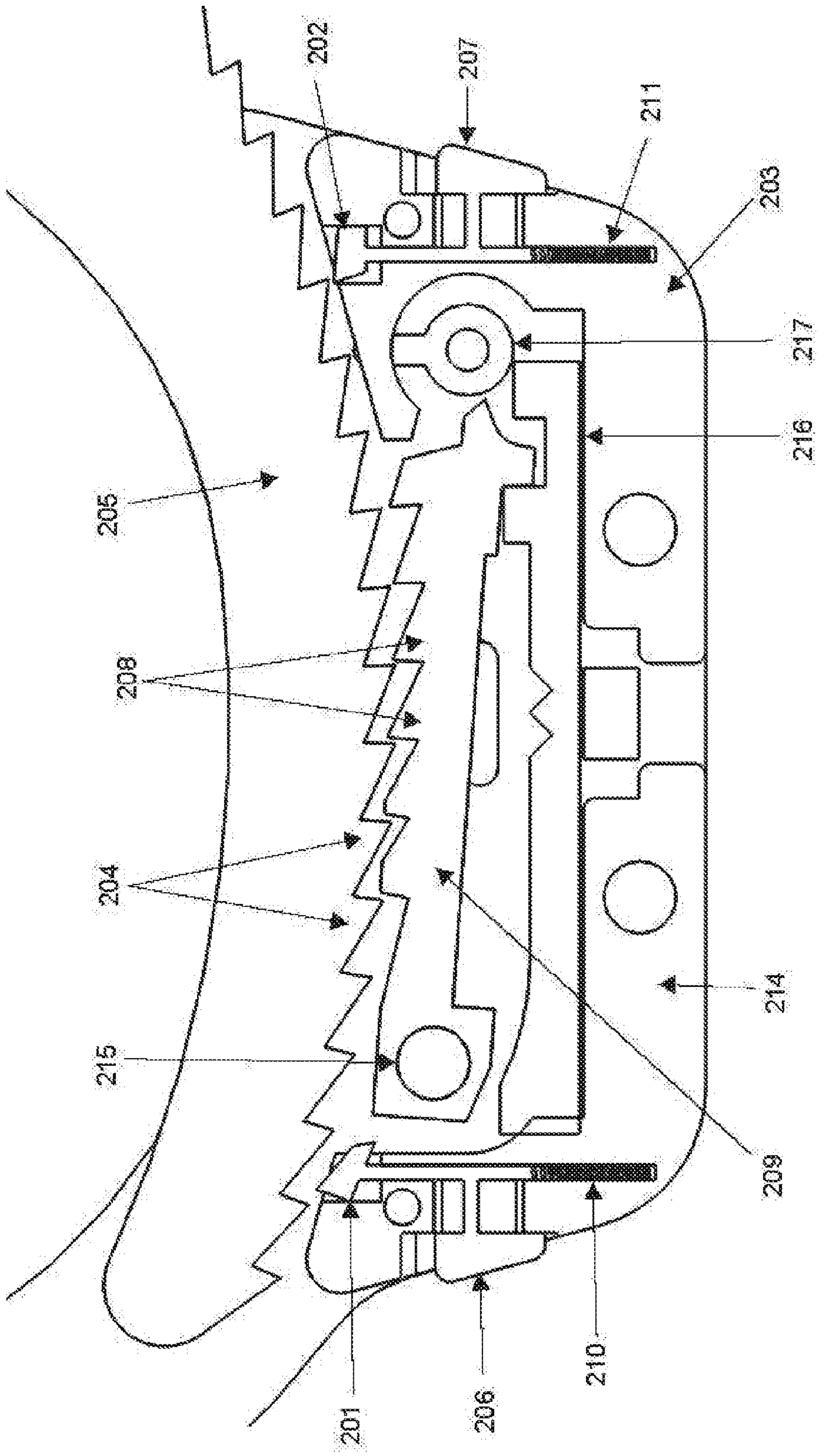
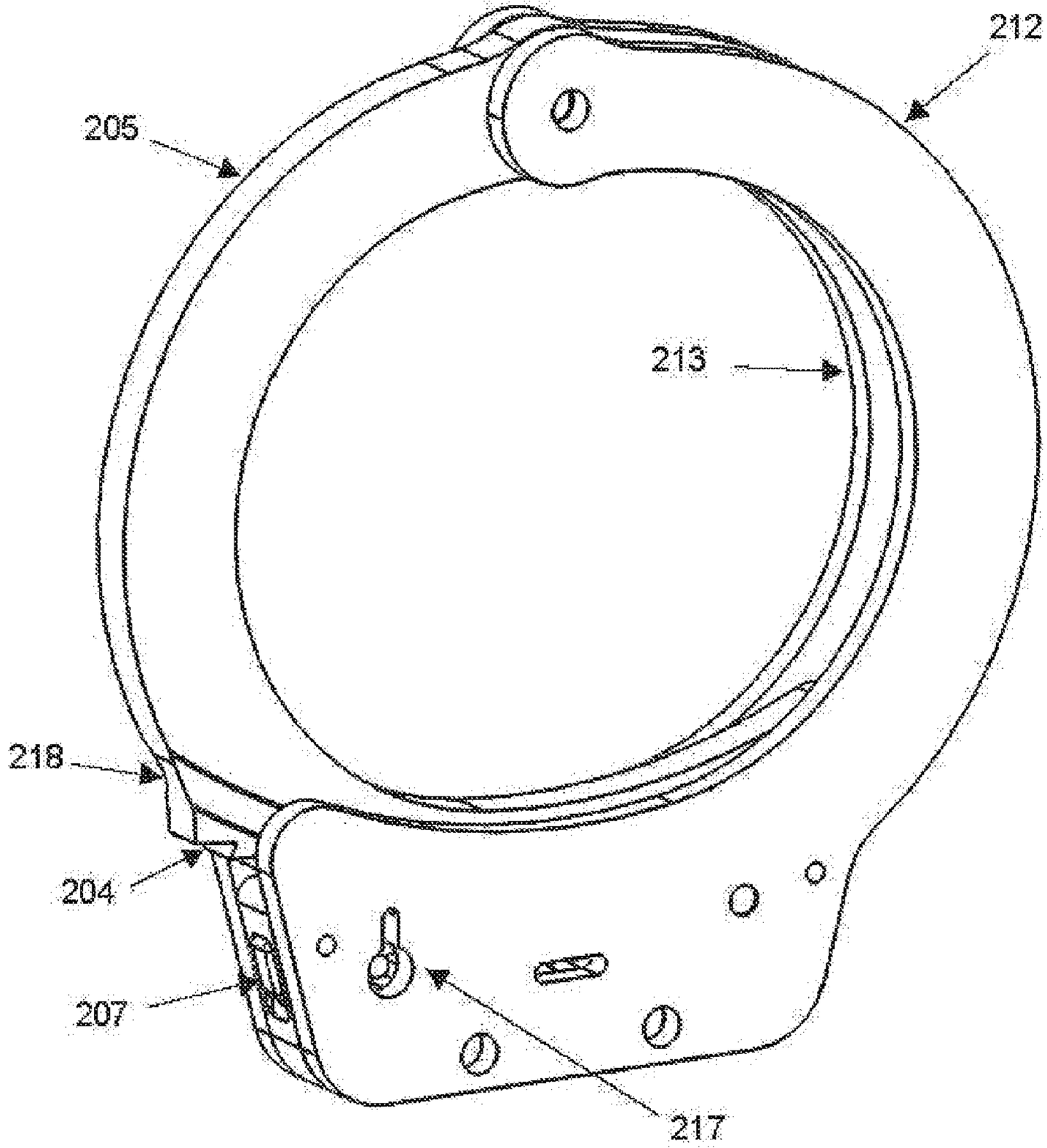



FIG. 2C

FIG. 2D



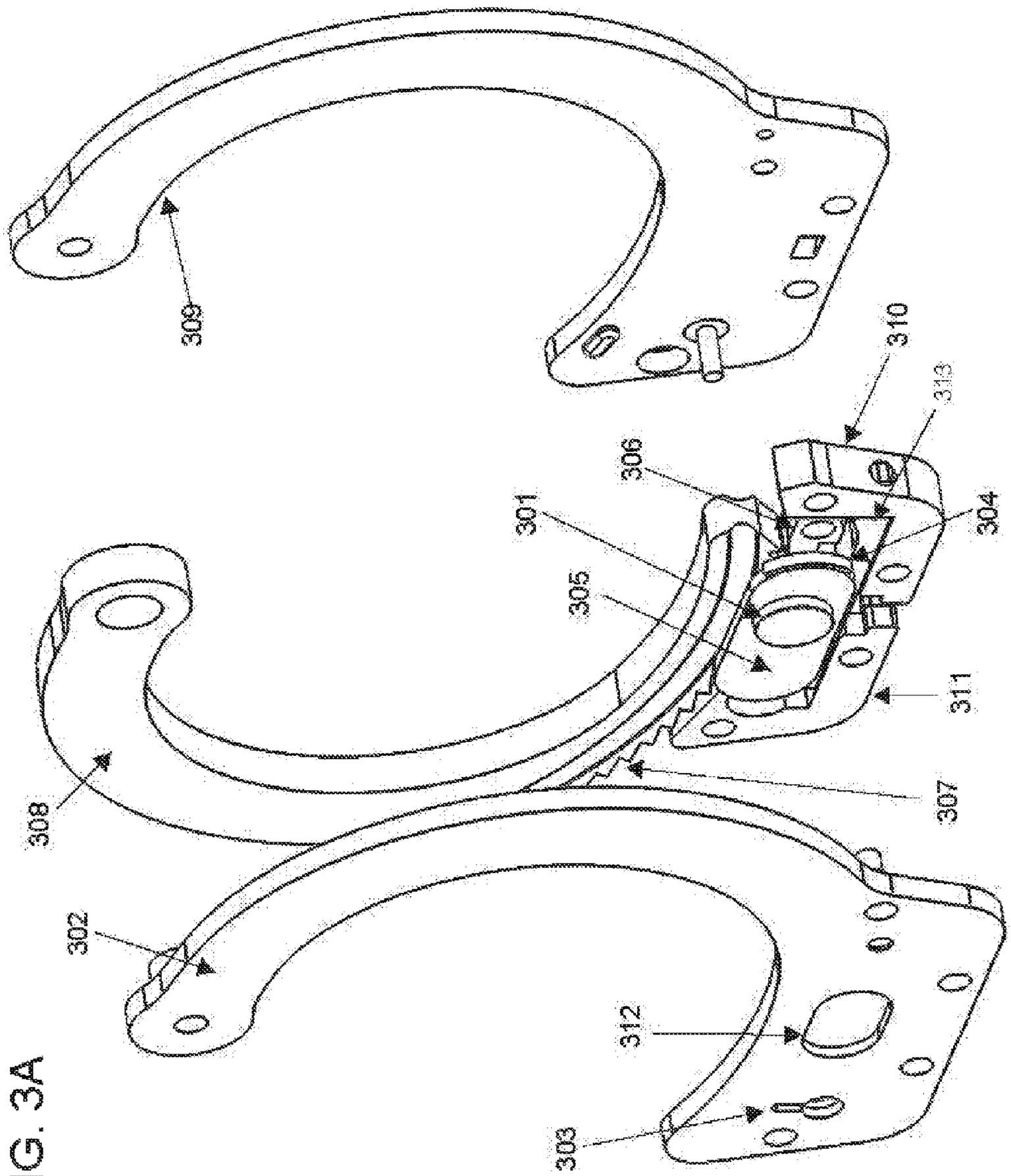



FIG. 3A

FIG. 3B

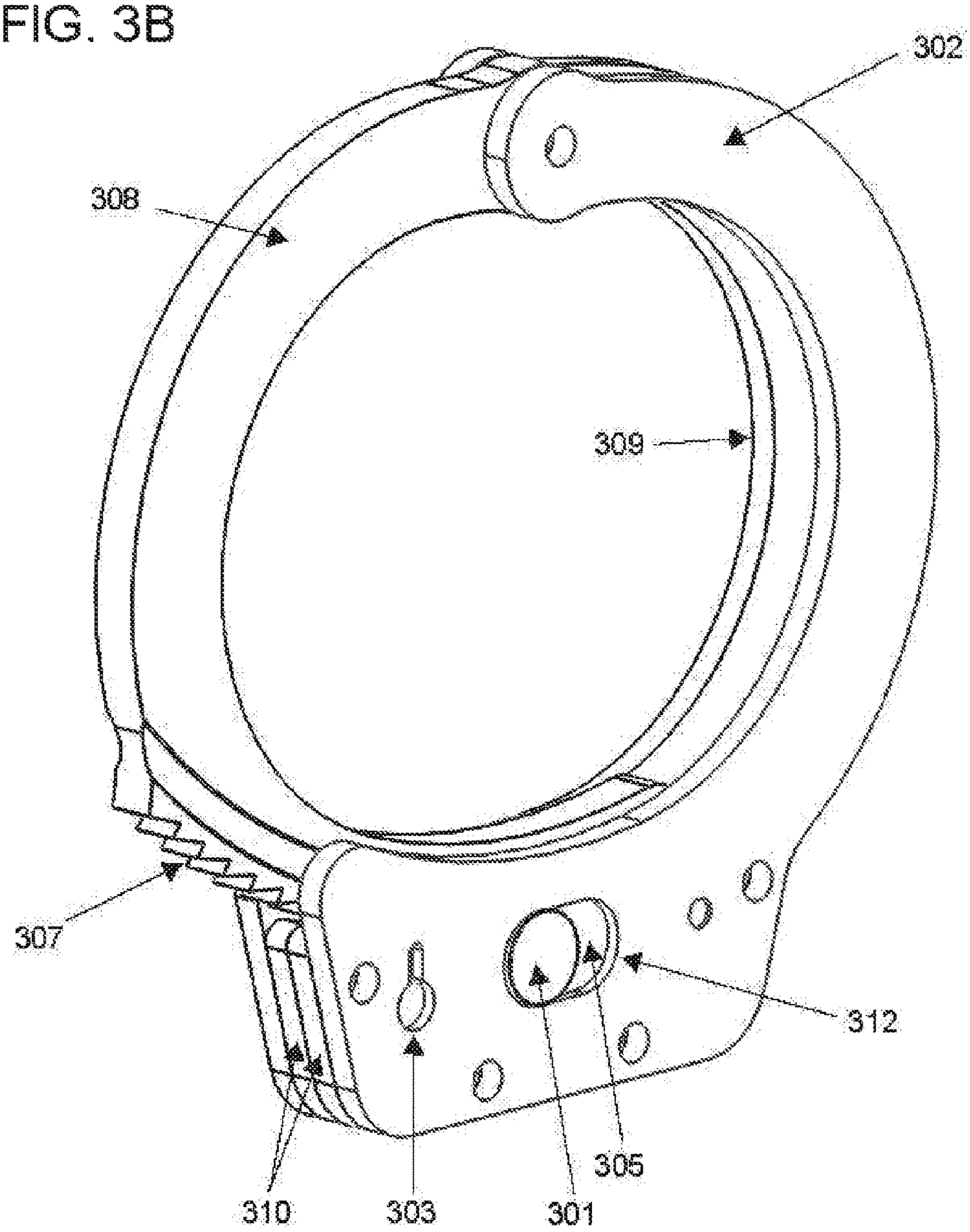
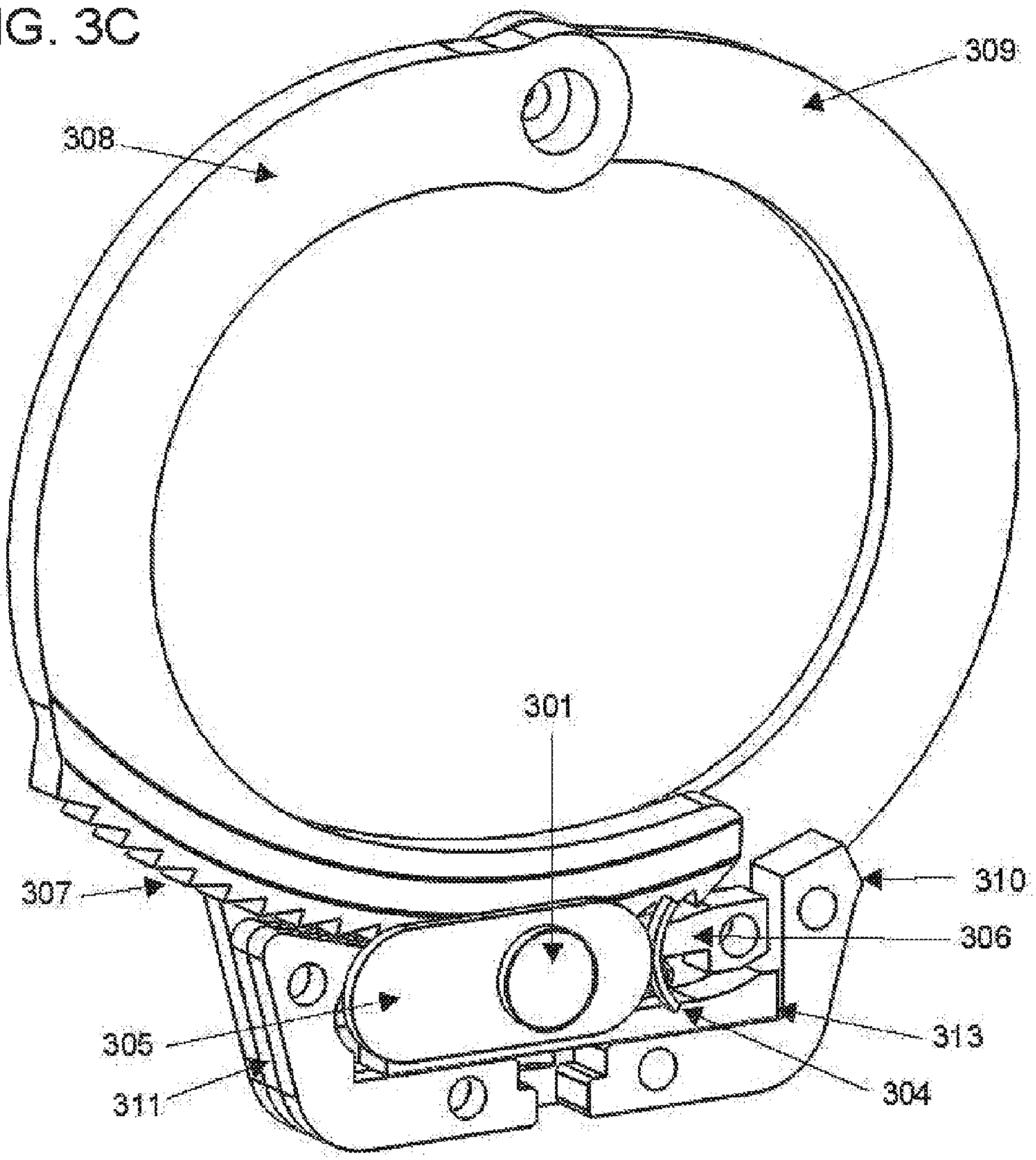


FIG. 3C



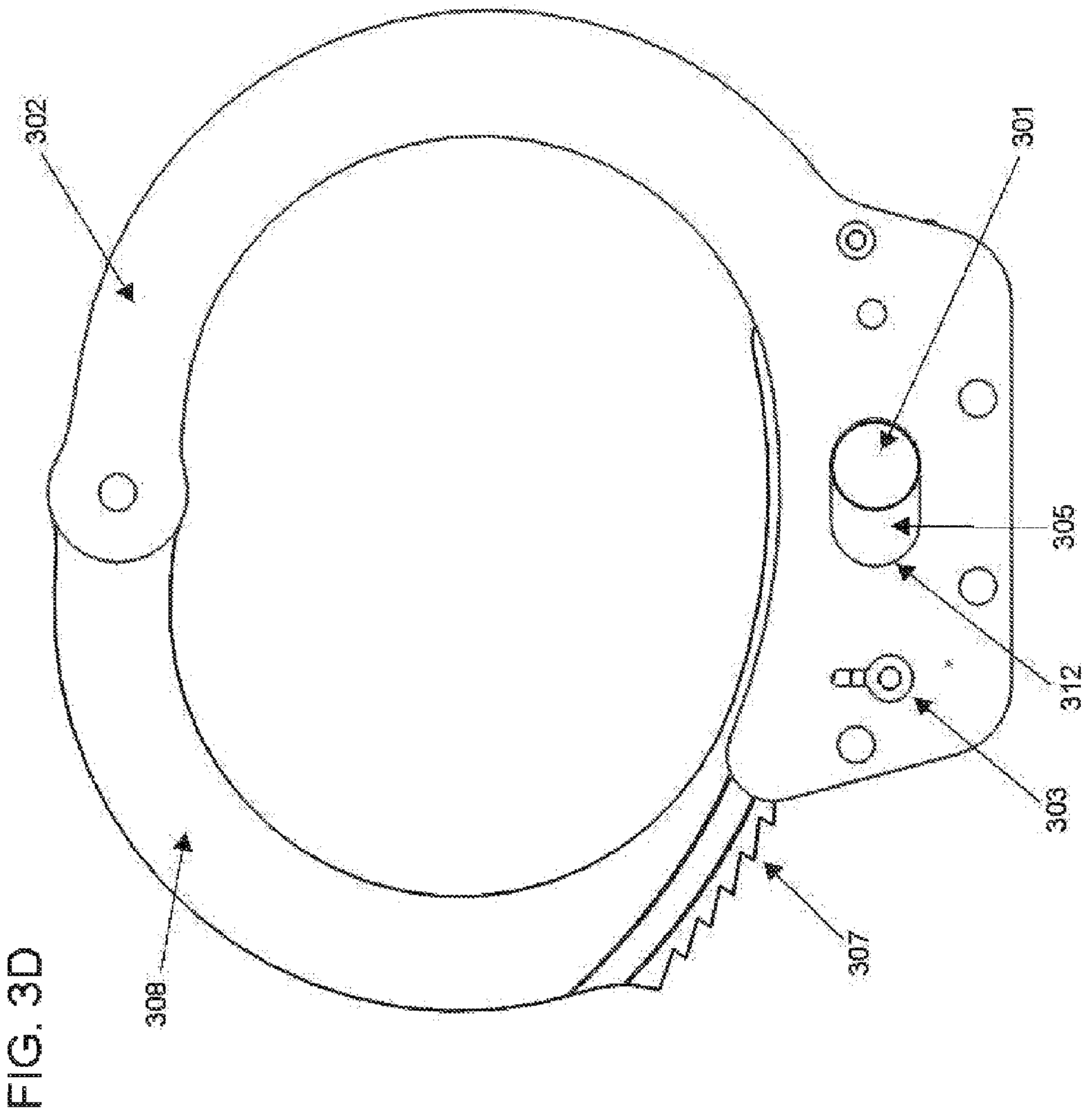
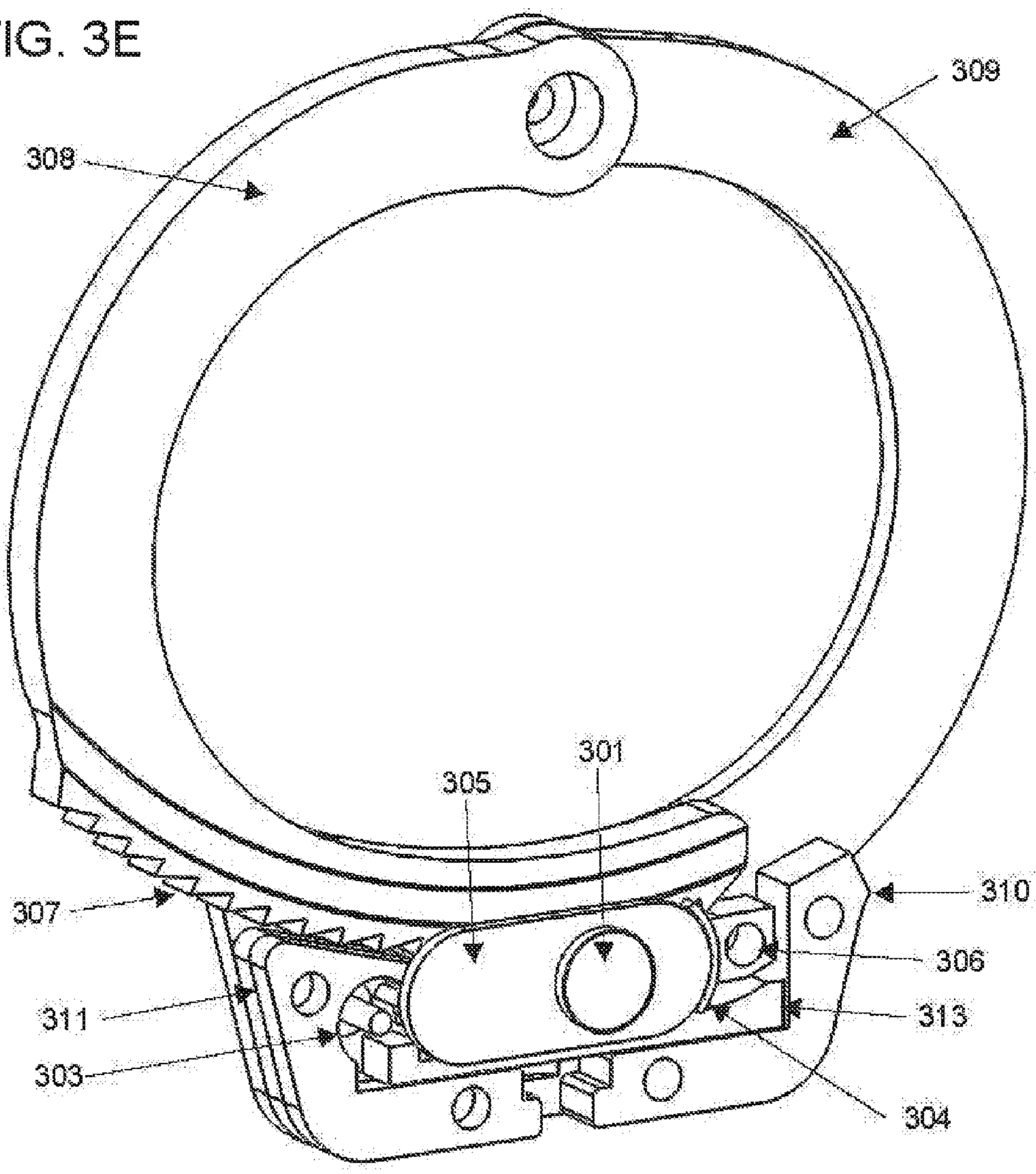



FIG. 3D

FIG. 3E



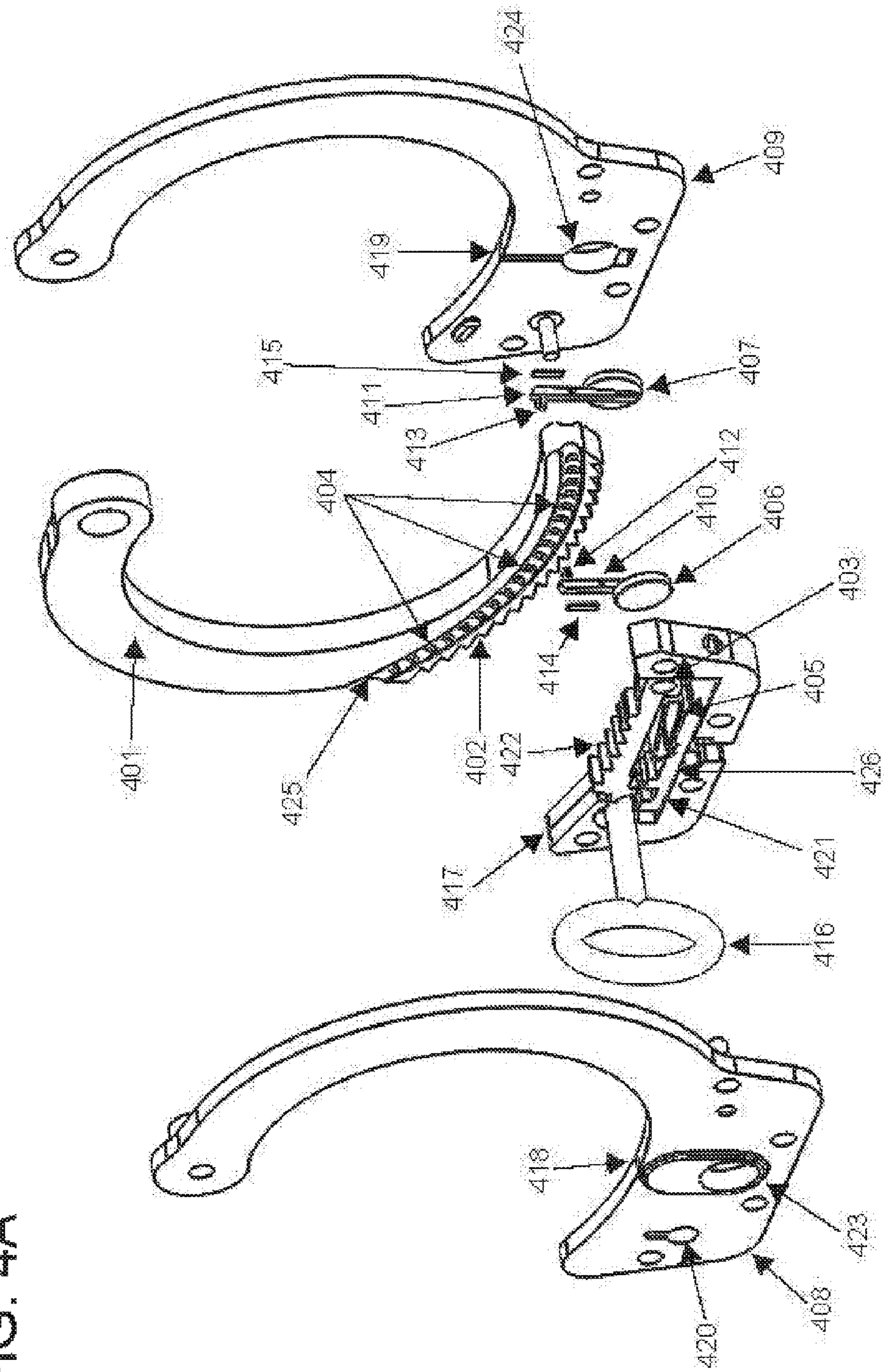

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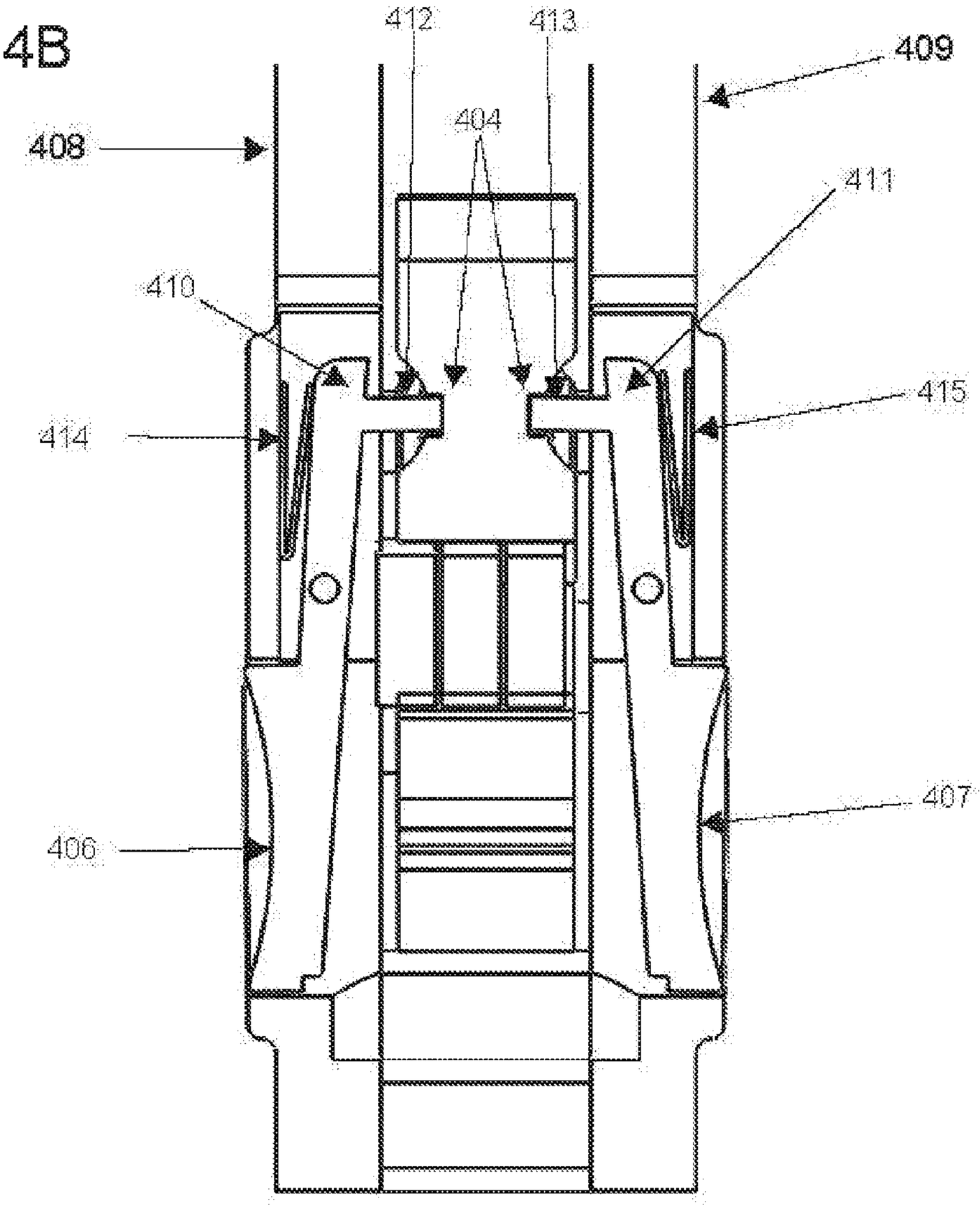
FIG. 4A

FIG. 4B



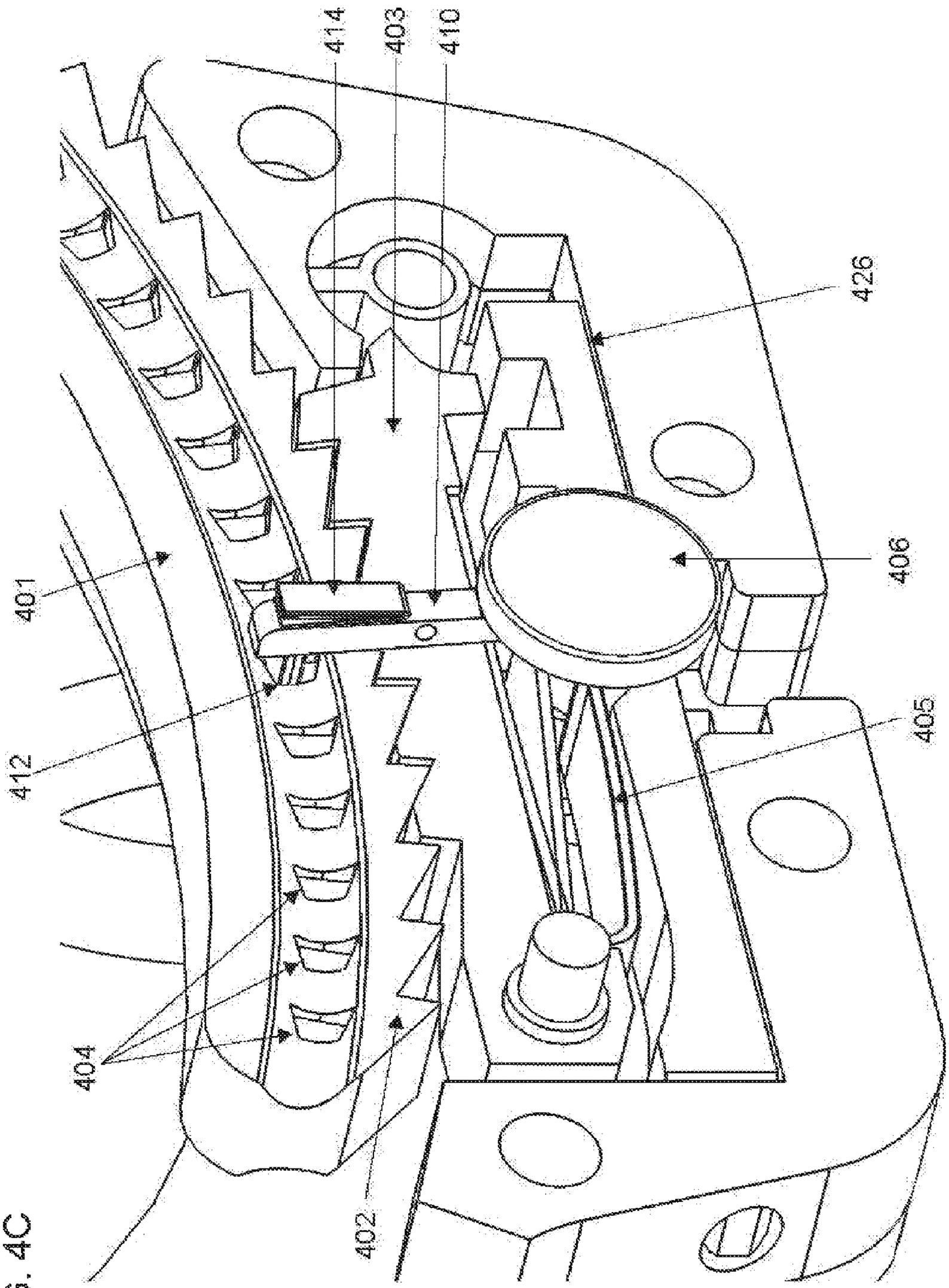
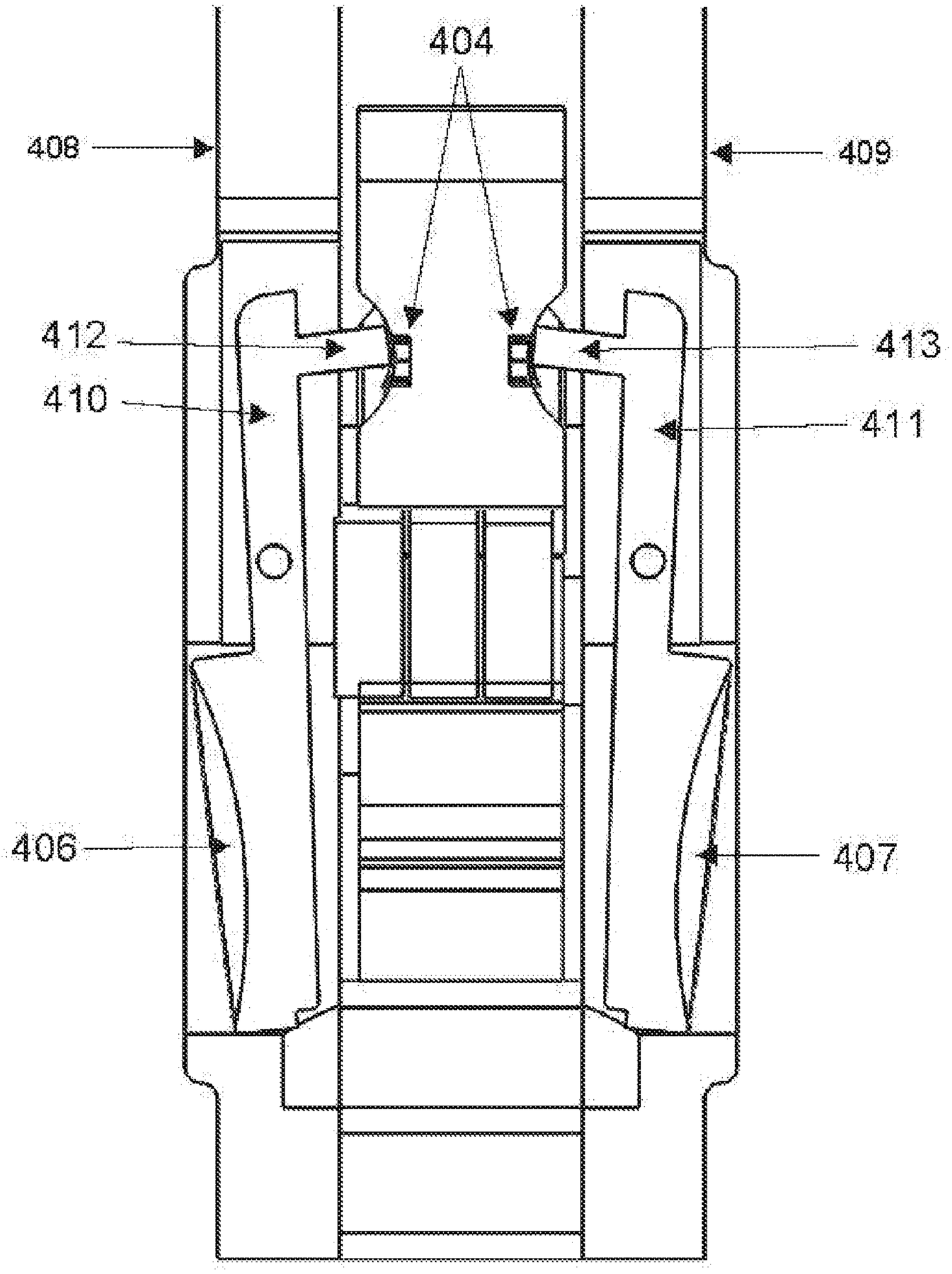



FIG. 4C

FIG. 4D



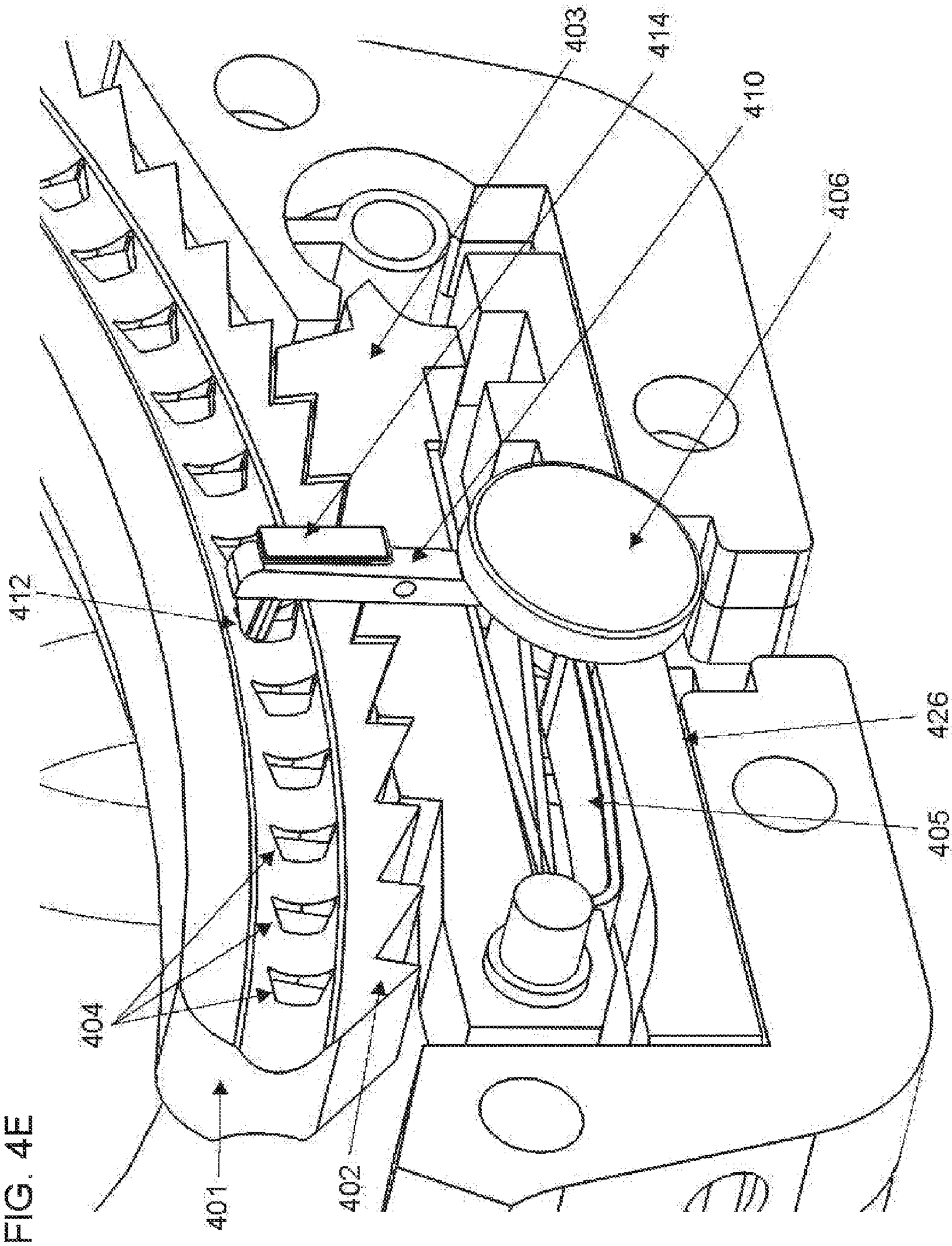



FIG. 4E

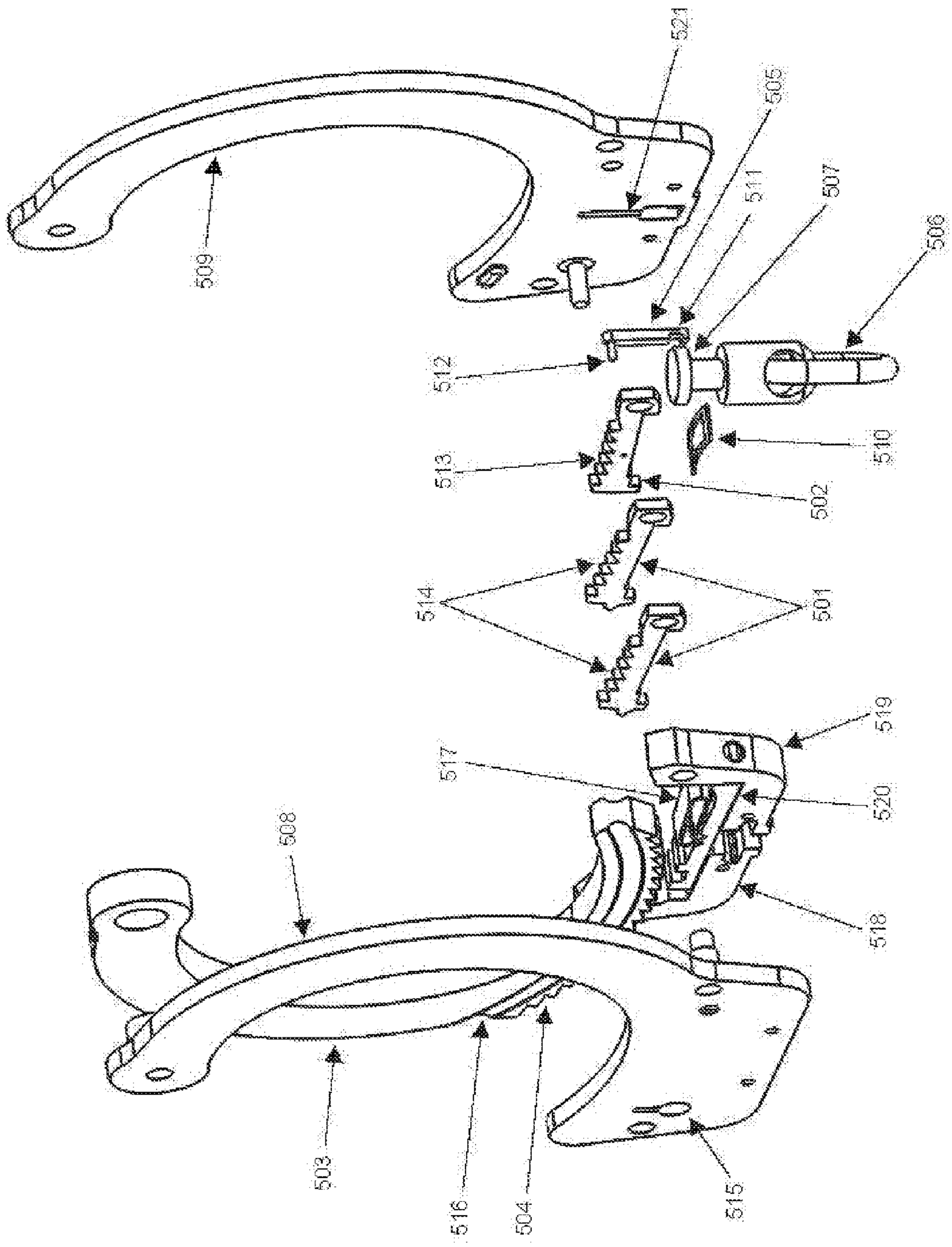

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FIG. 5A

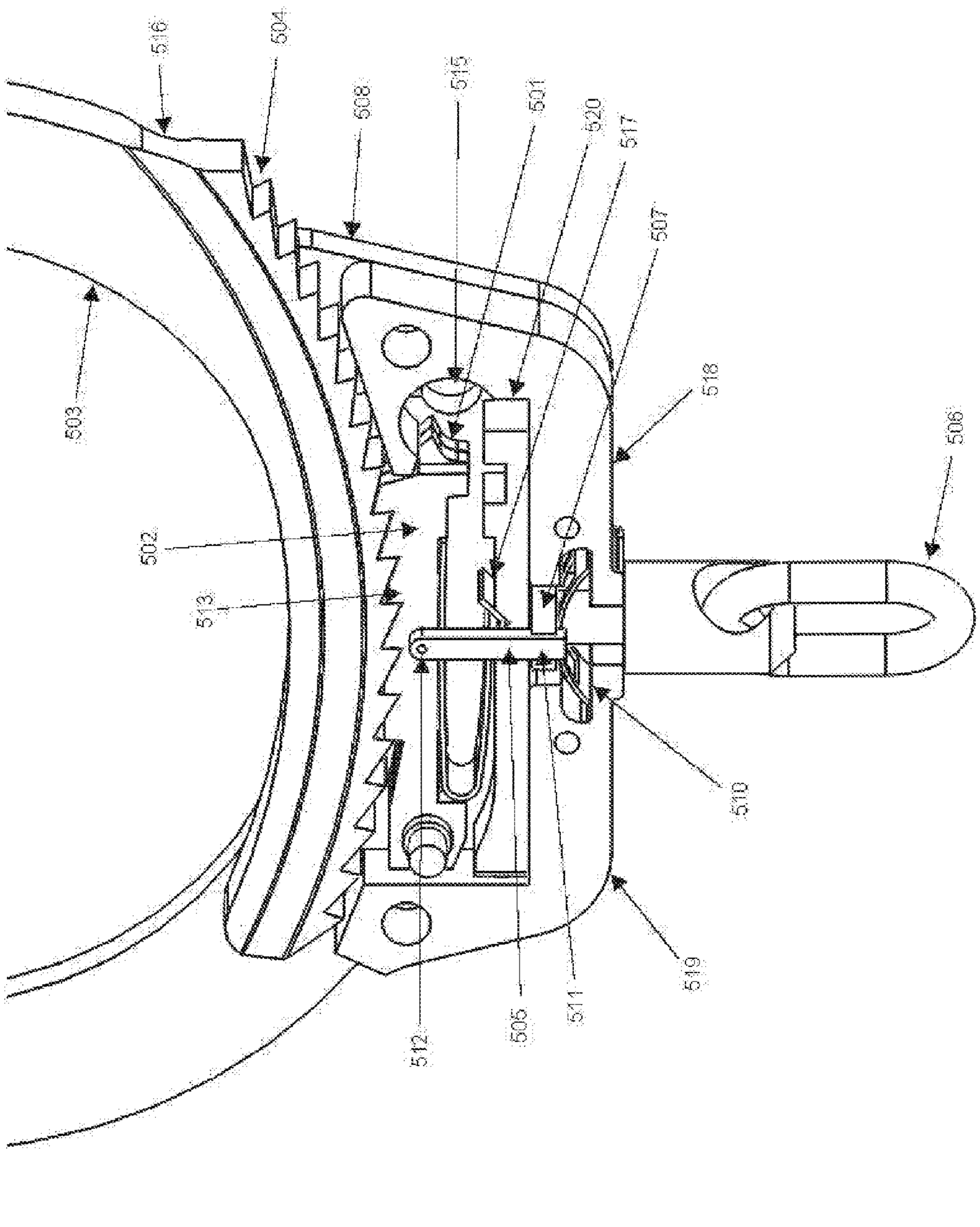
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FIG. 5B

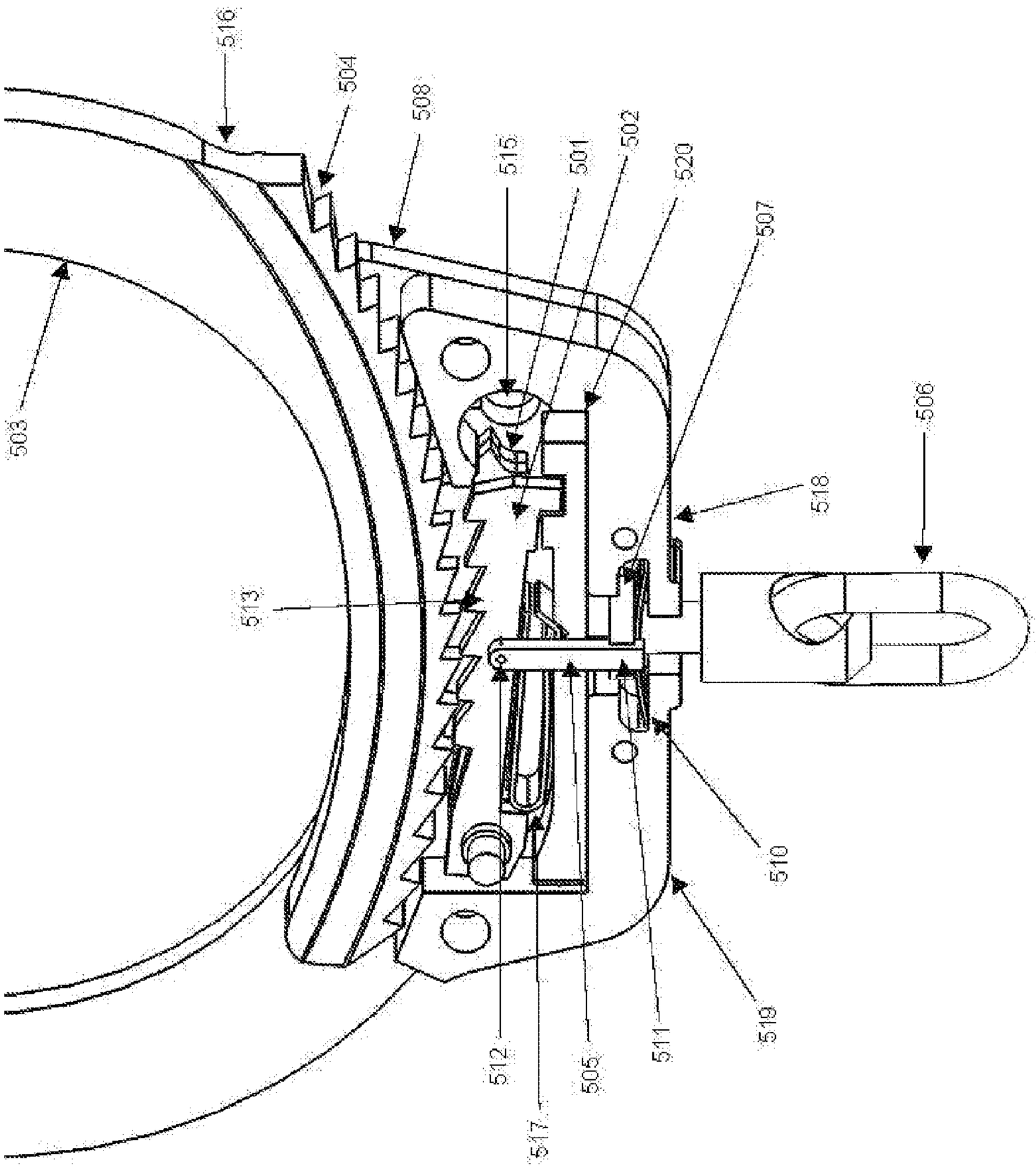
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FIG. 5C

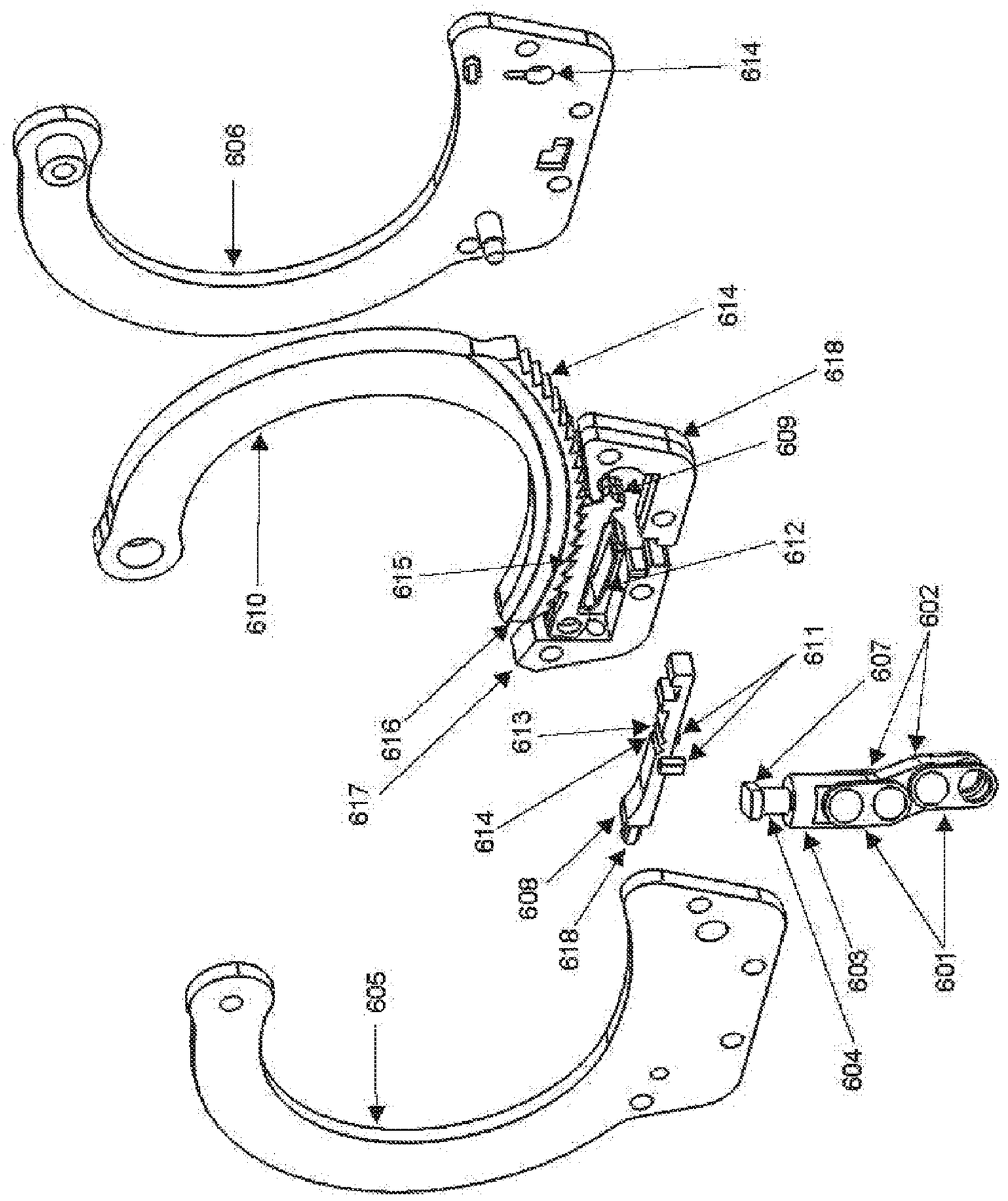
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FIG. 6A

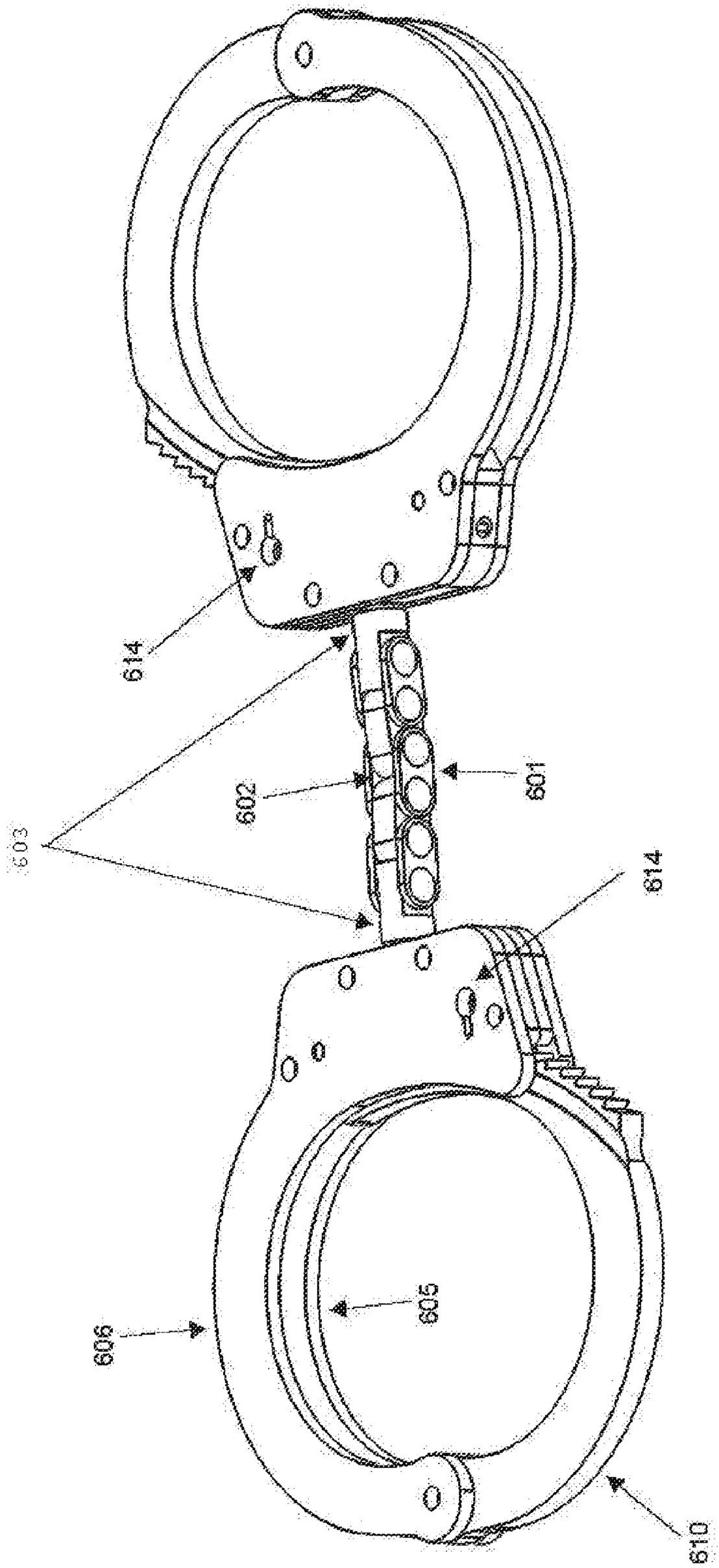



FIG. 6B

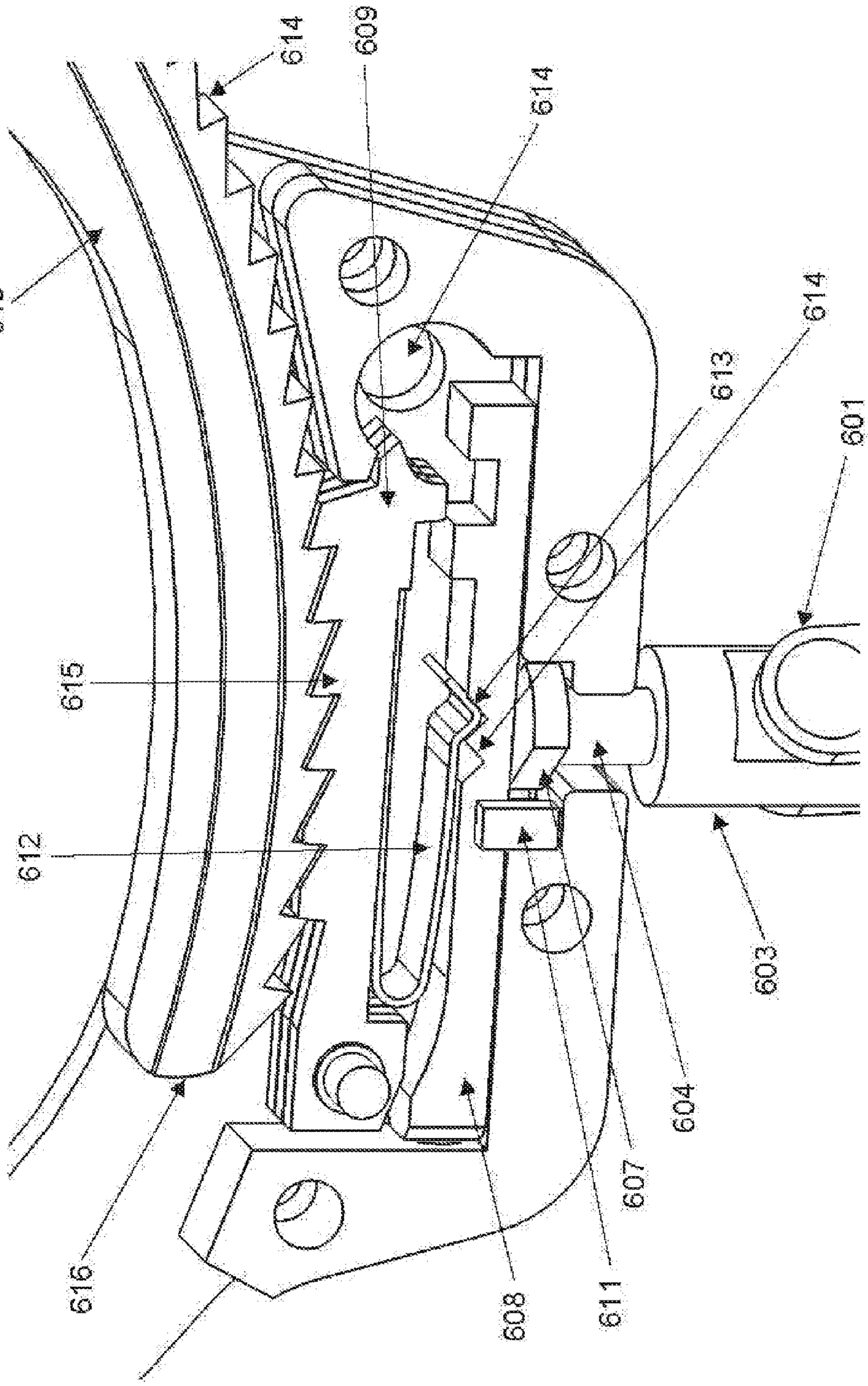



FIG. 6C

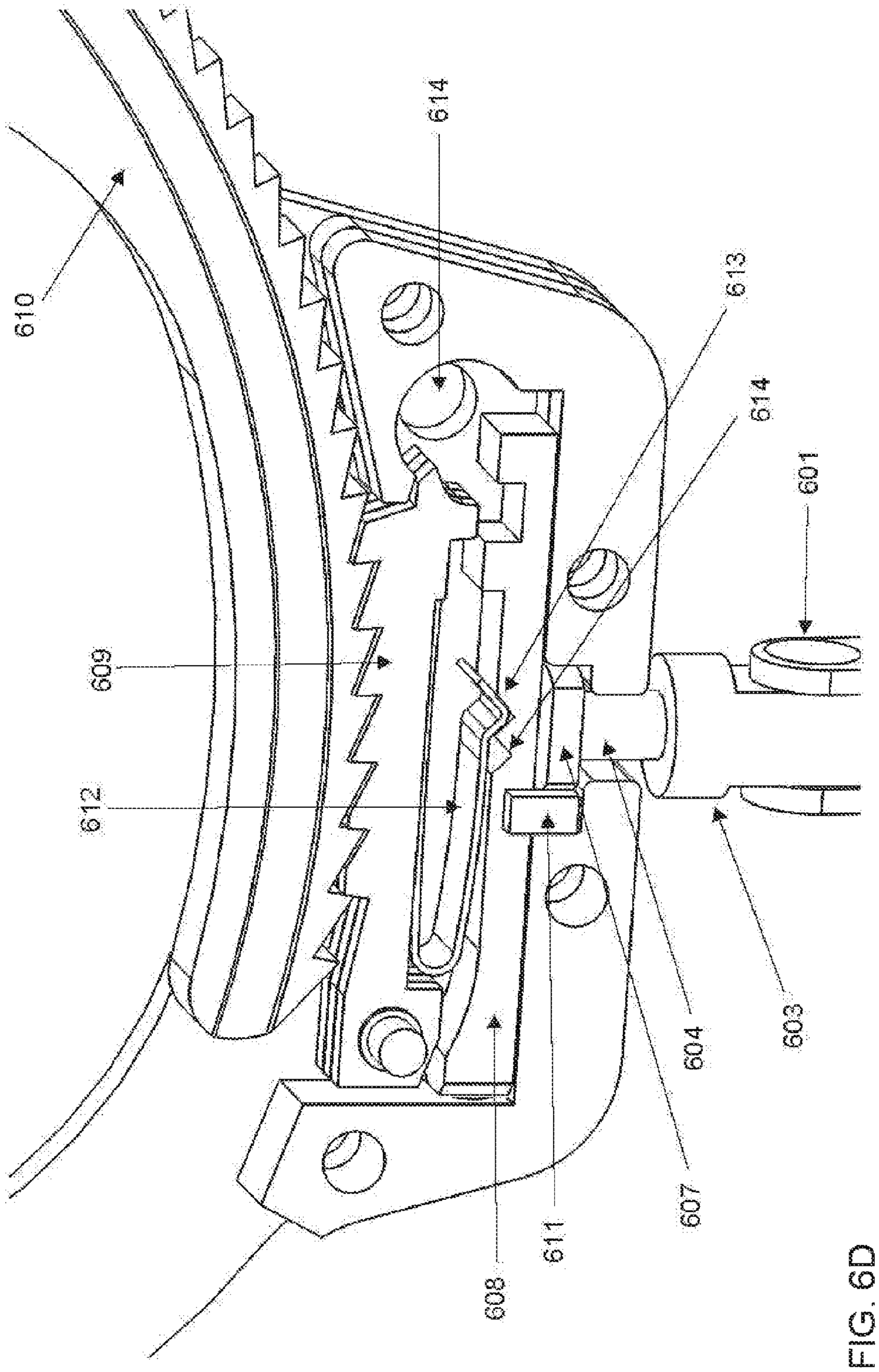



FIG. 6D

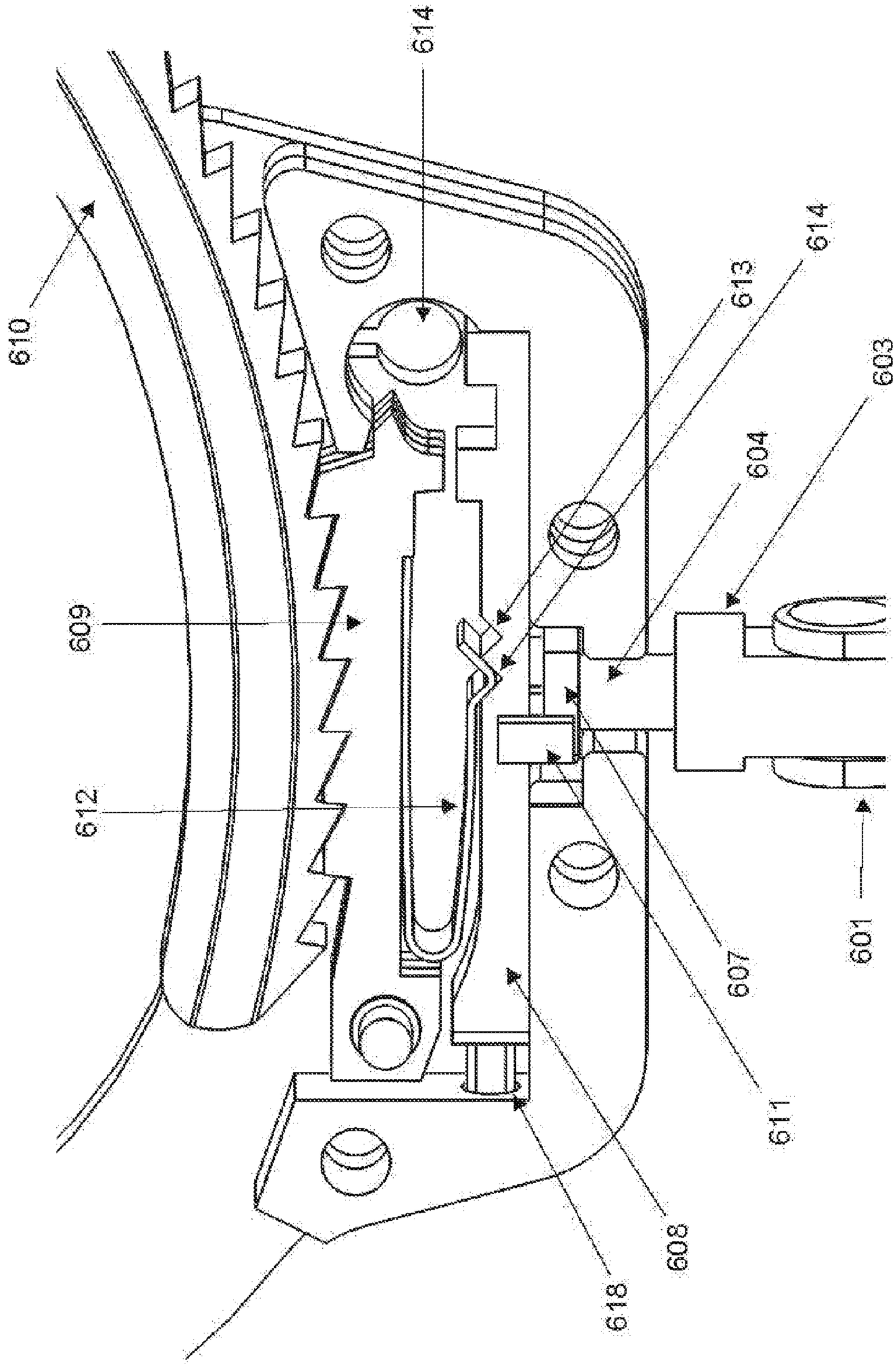



FIG. 6E

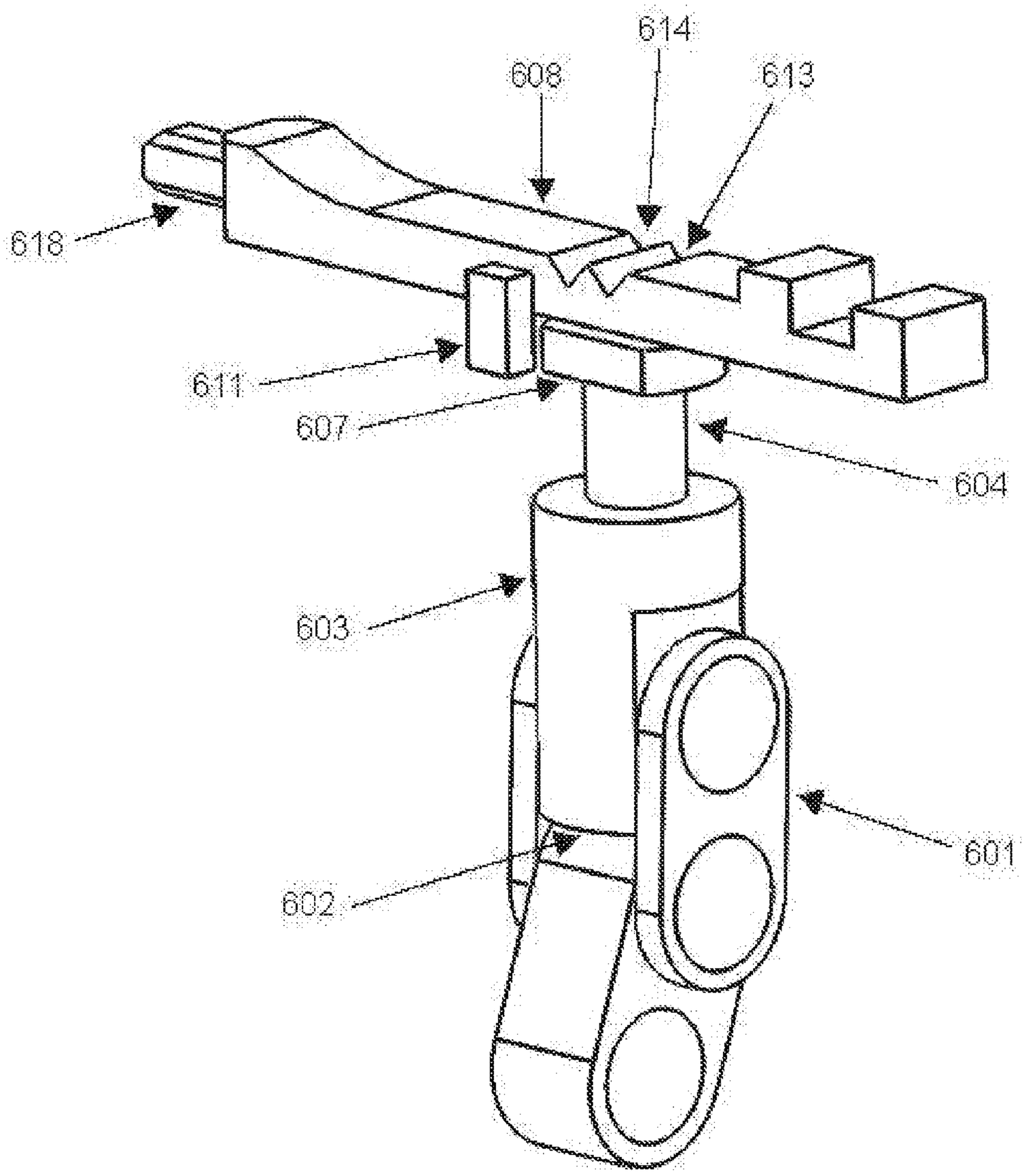



FIG. 6F

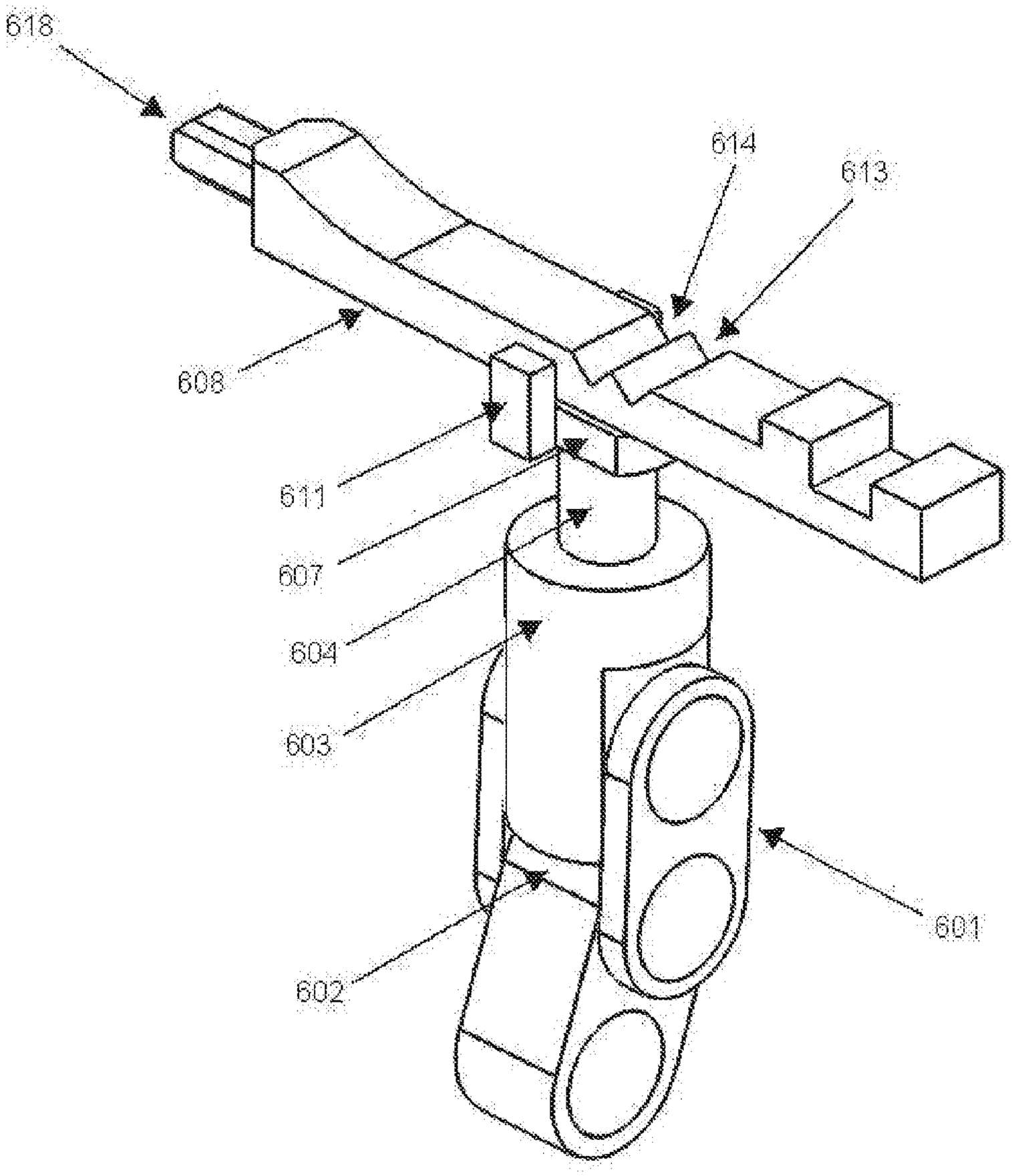



FIG. 6G

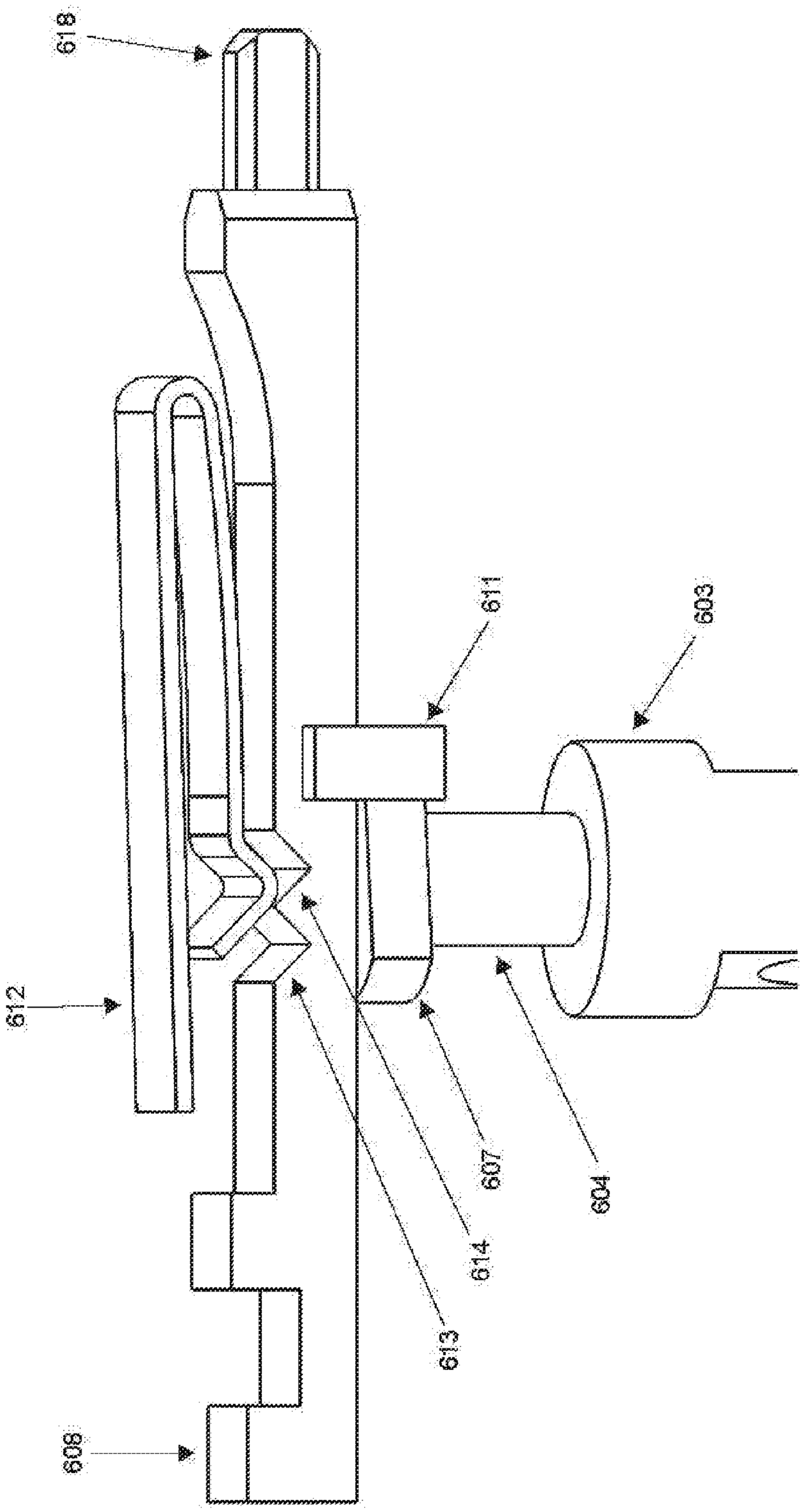



FIG. 6H

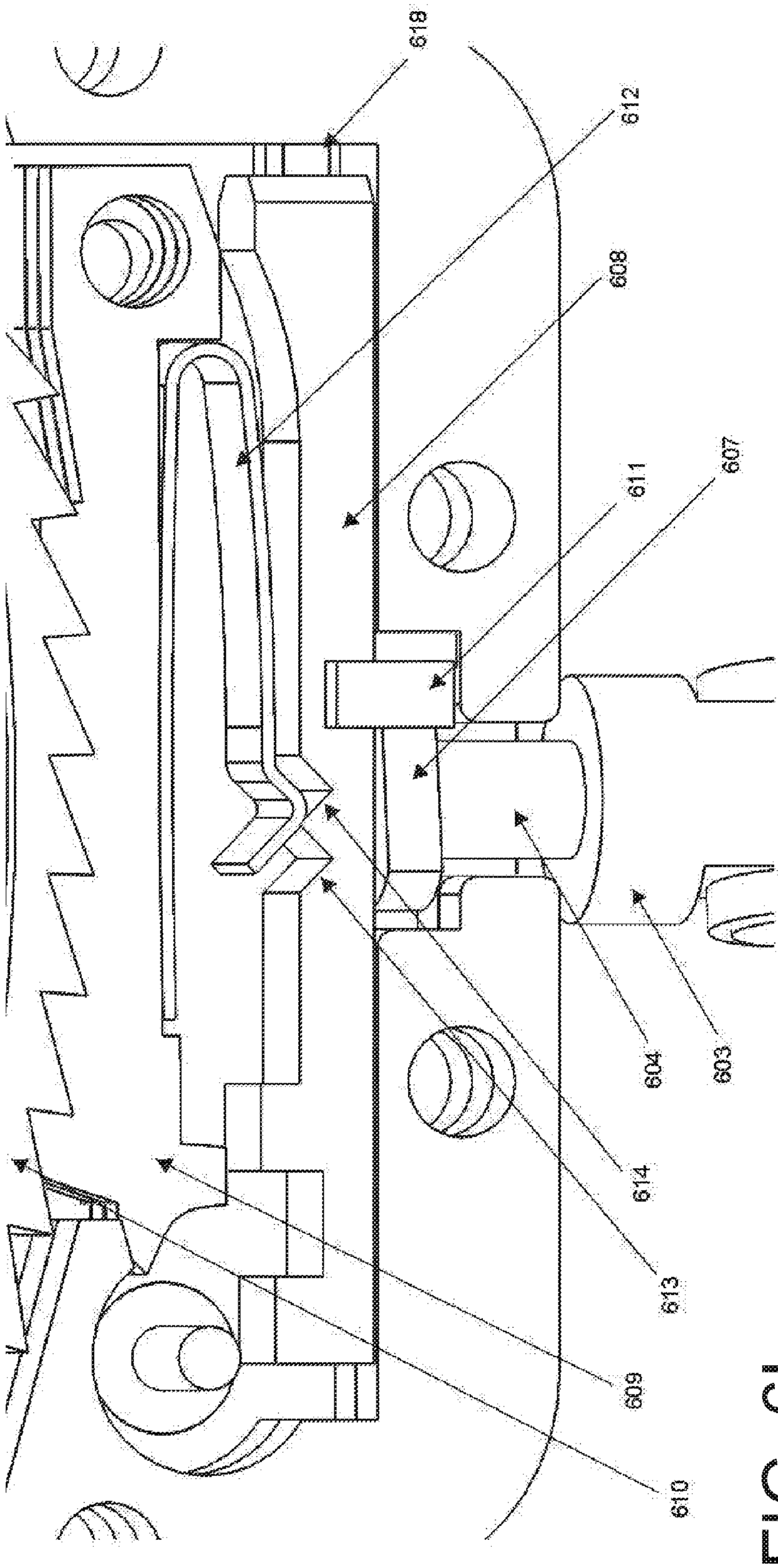



FIG. 6I

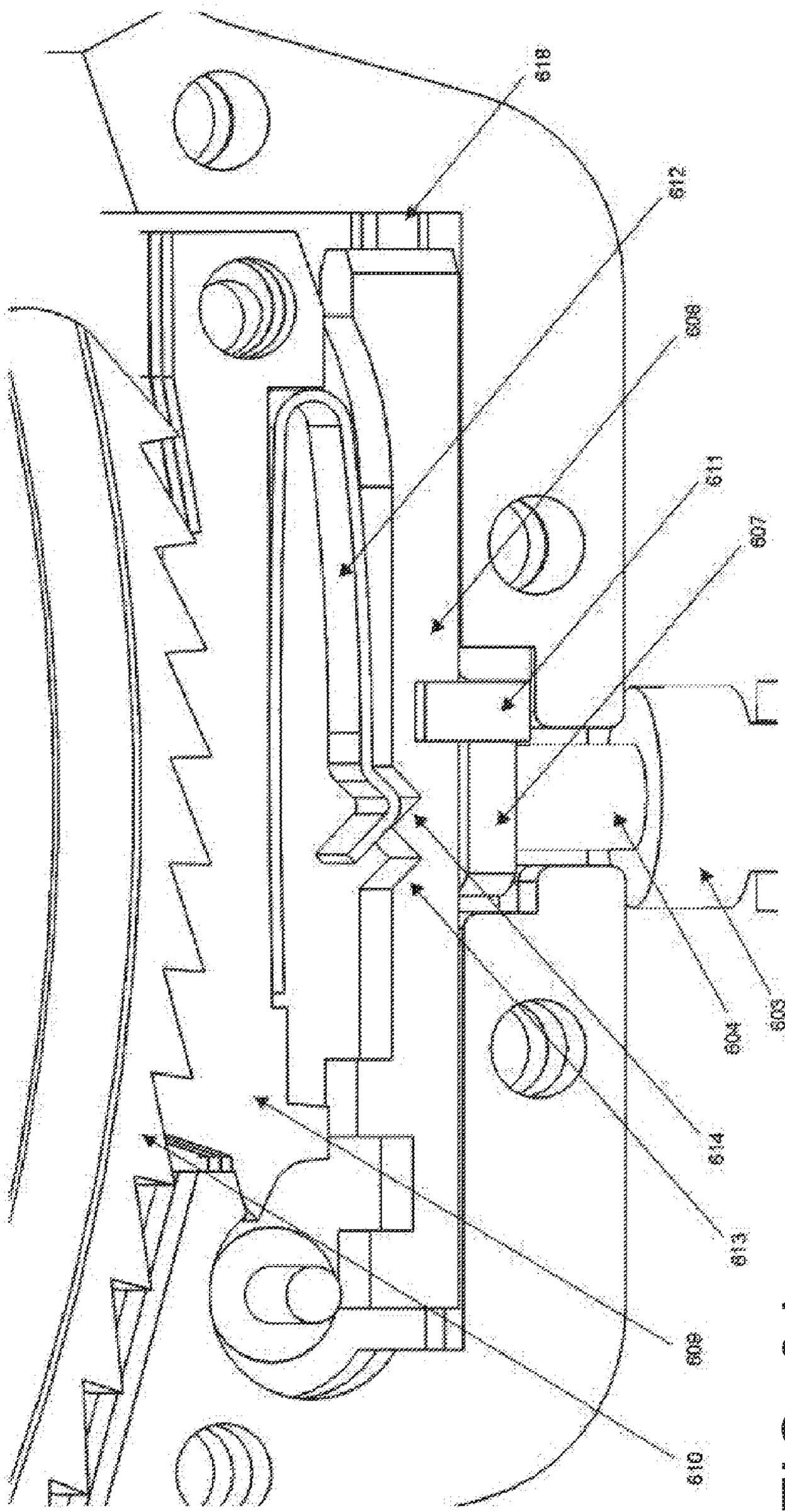



FIG. 6J

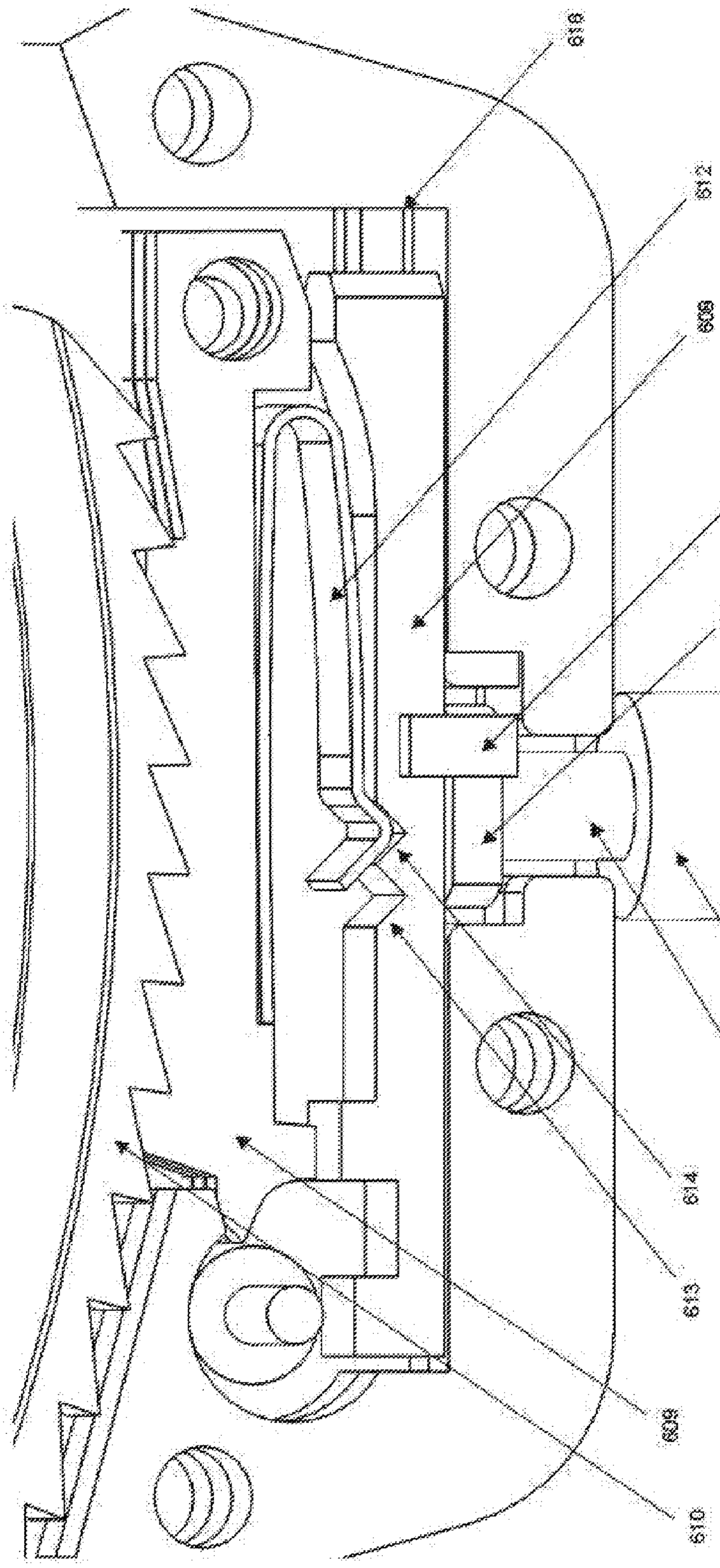



FIG. 6K

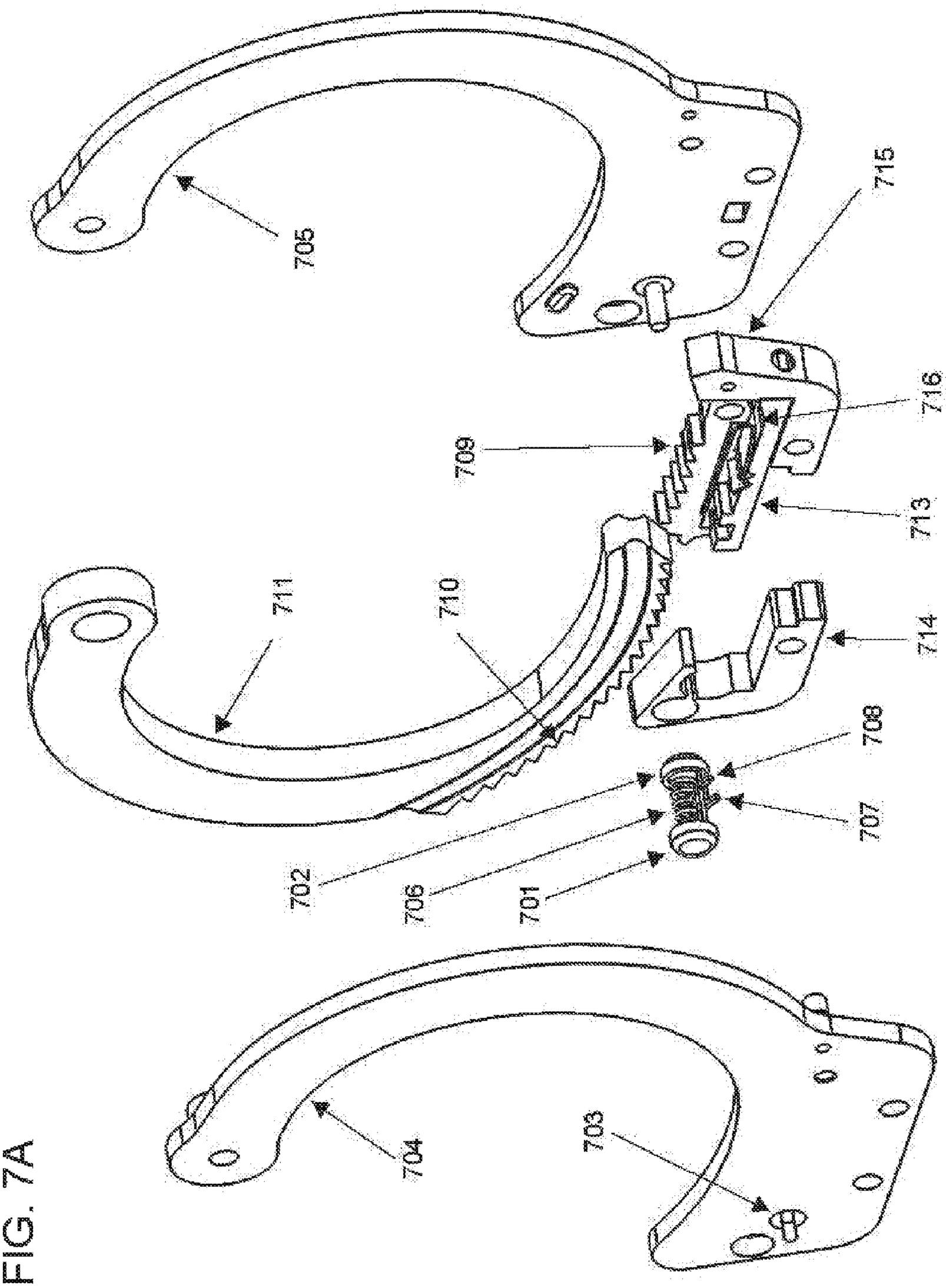



FIG. 7A

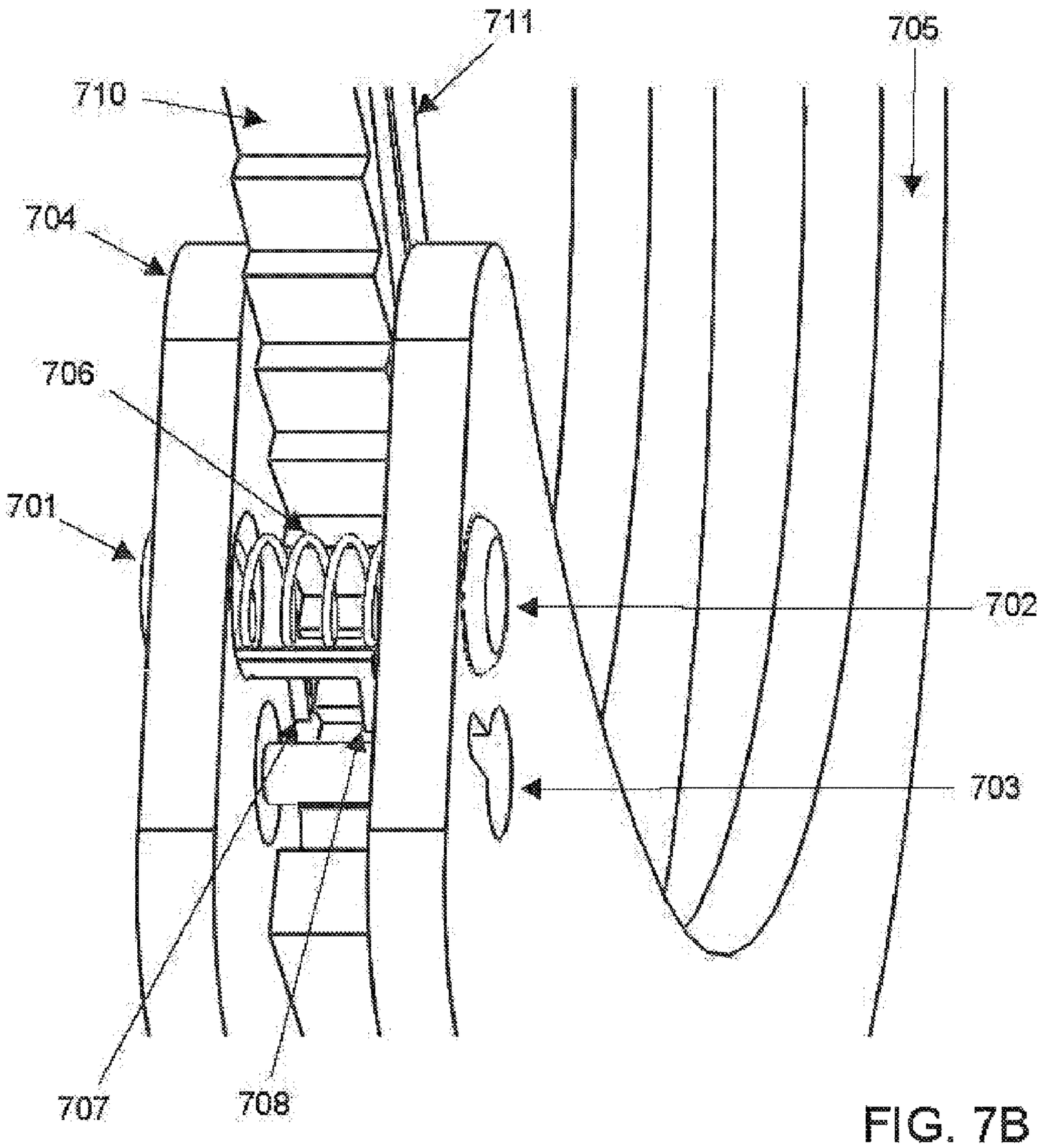
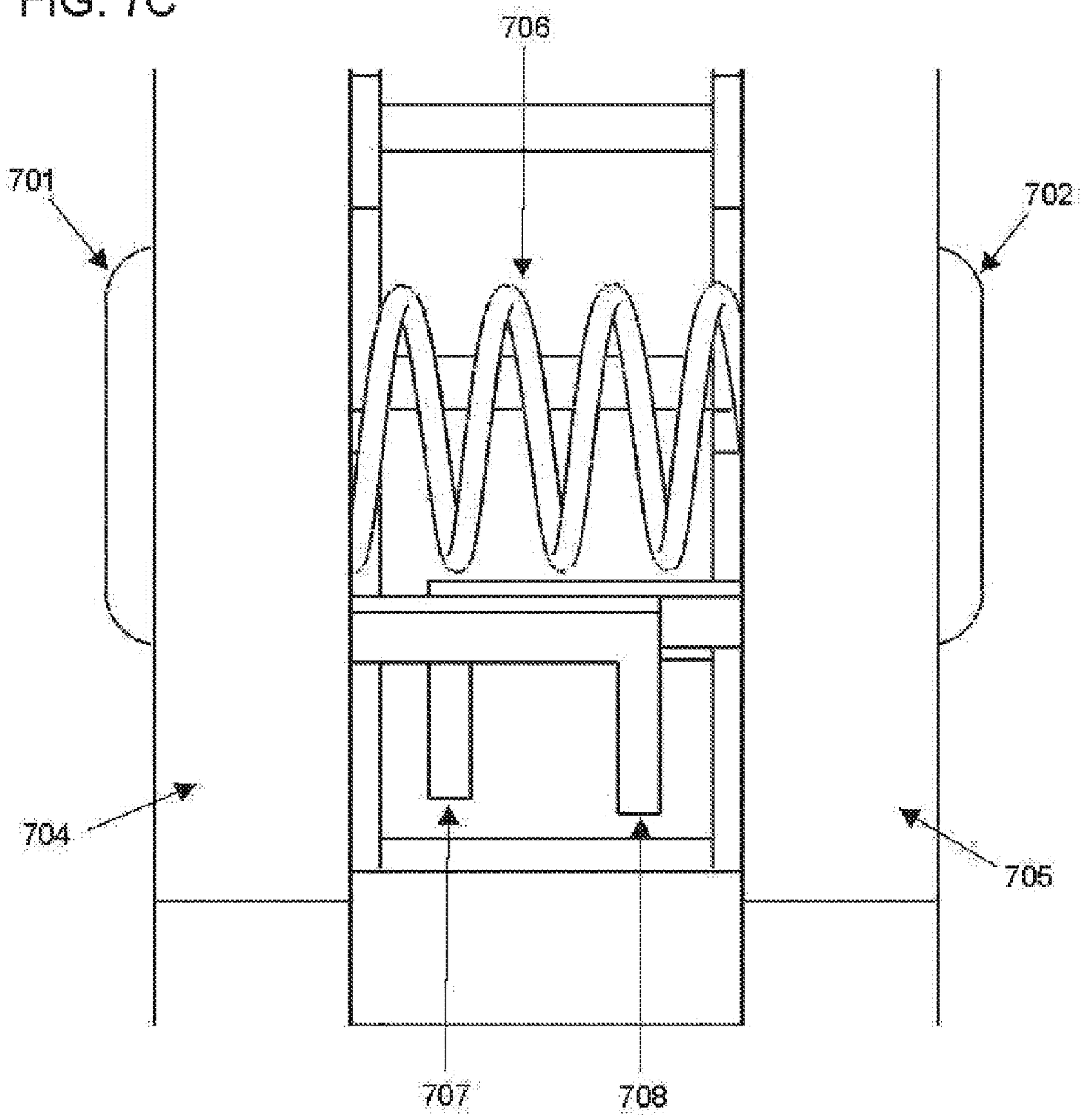



FIG. 7B

FIG. 7C



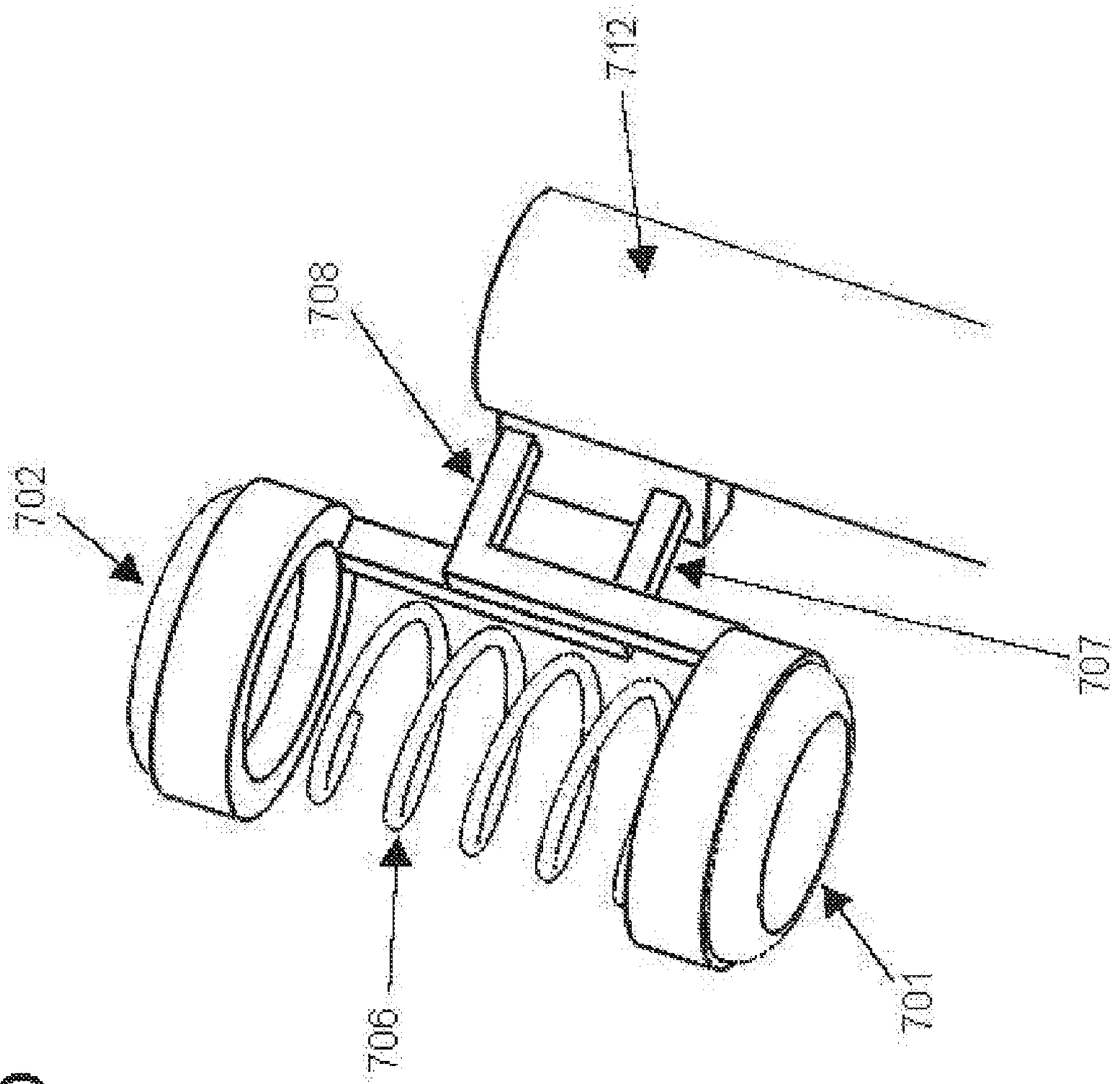
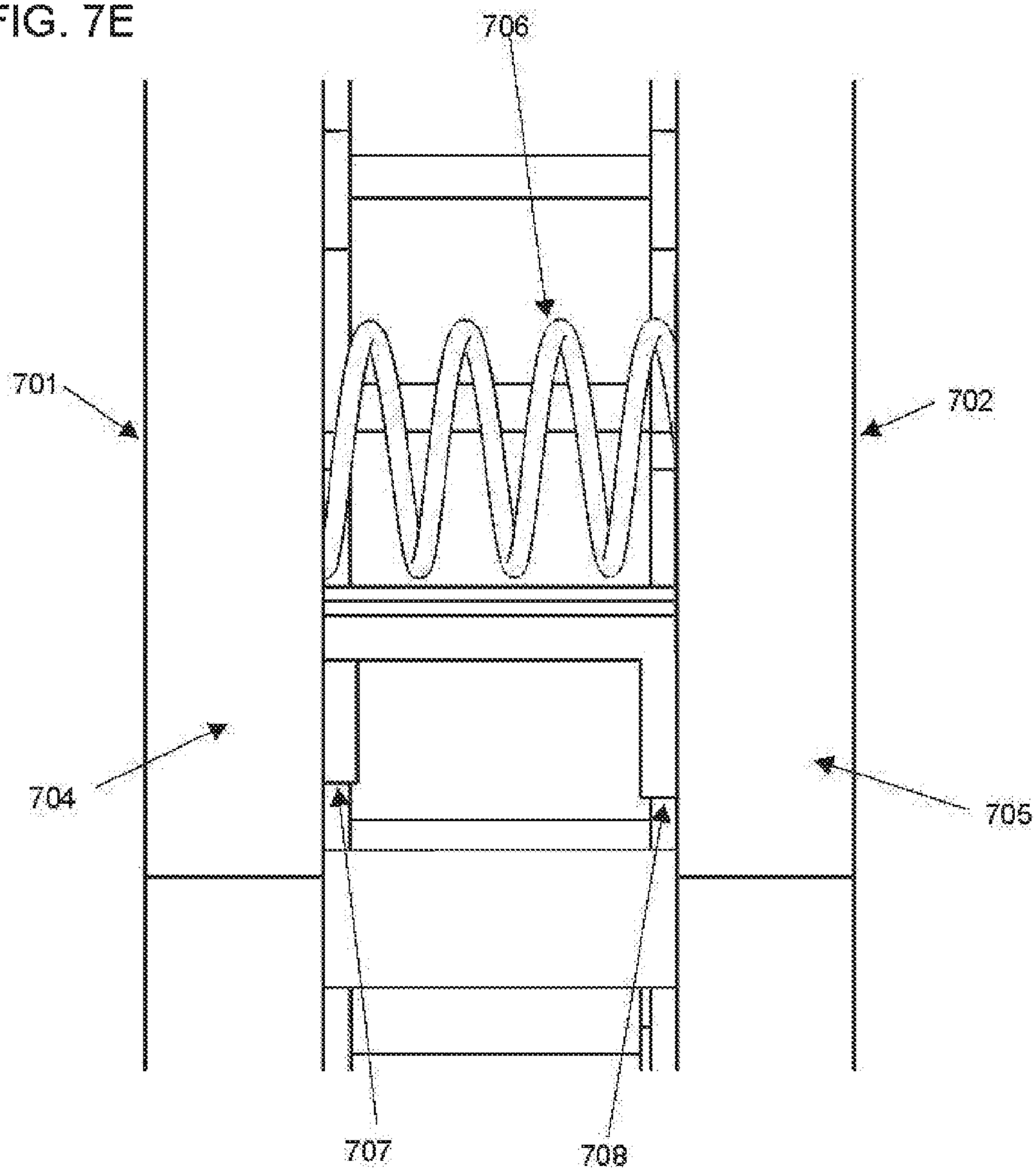



FIG. 7D

FIG. 7E



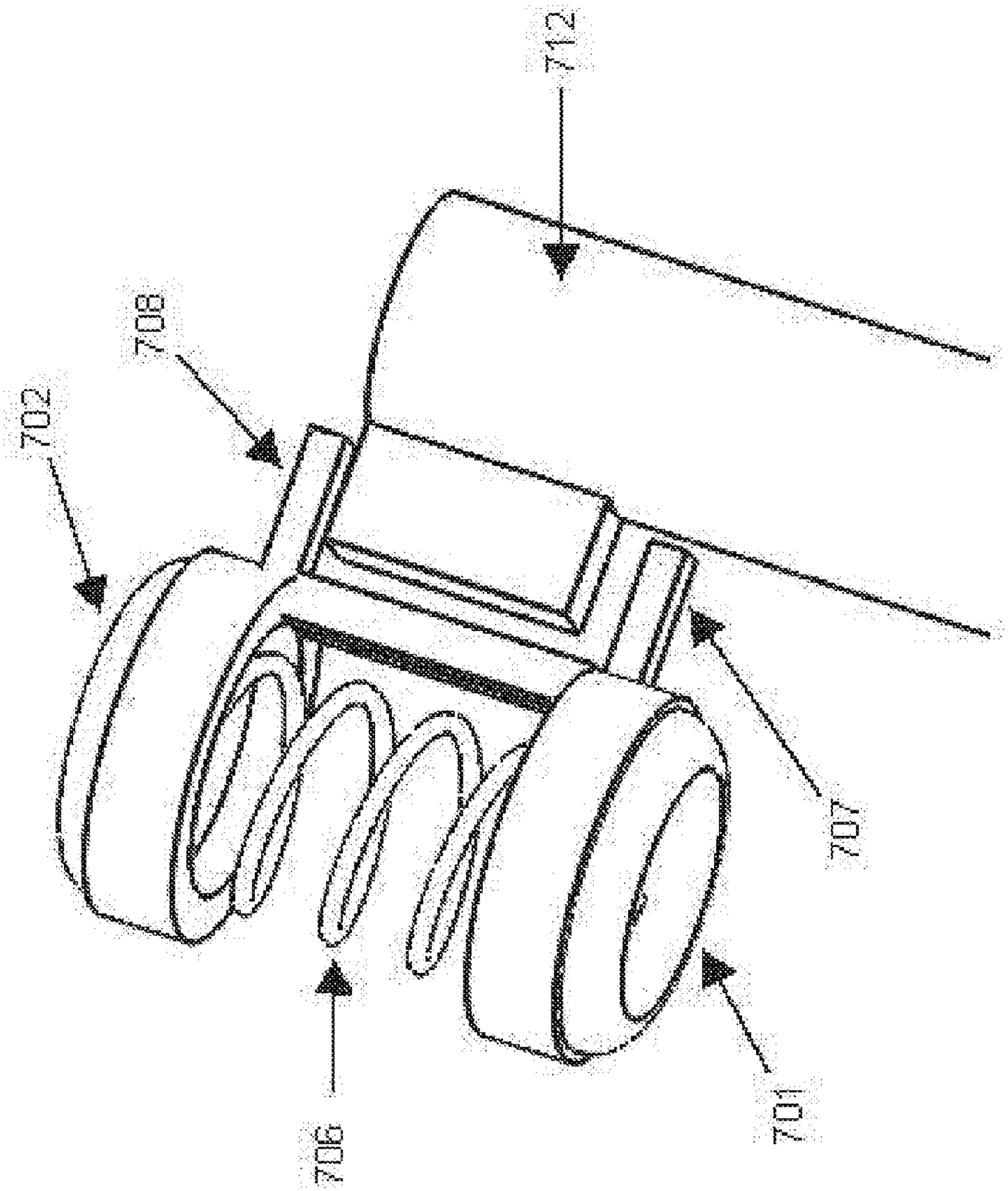
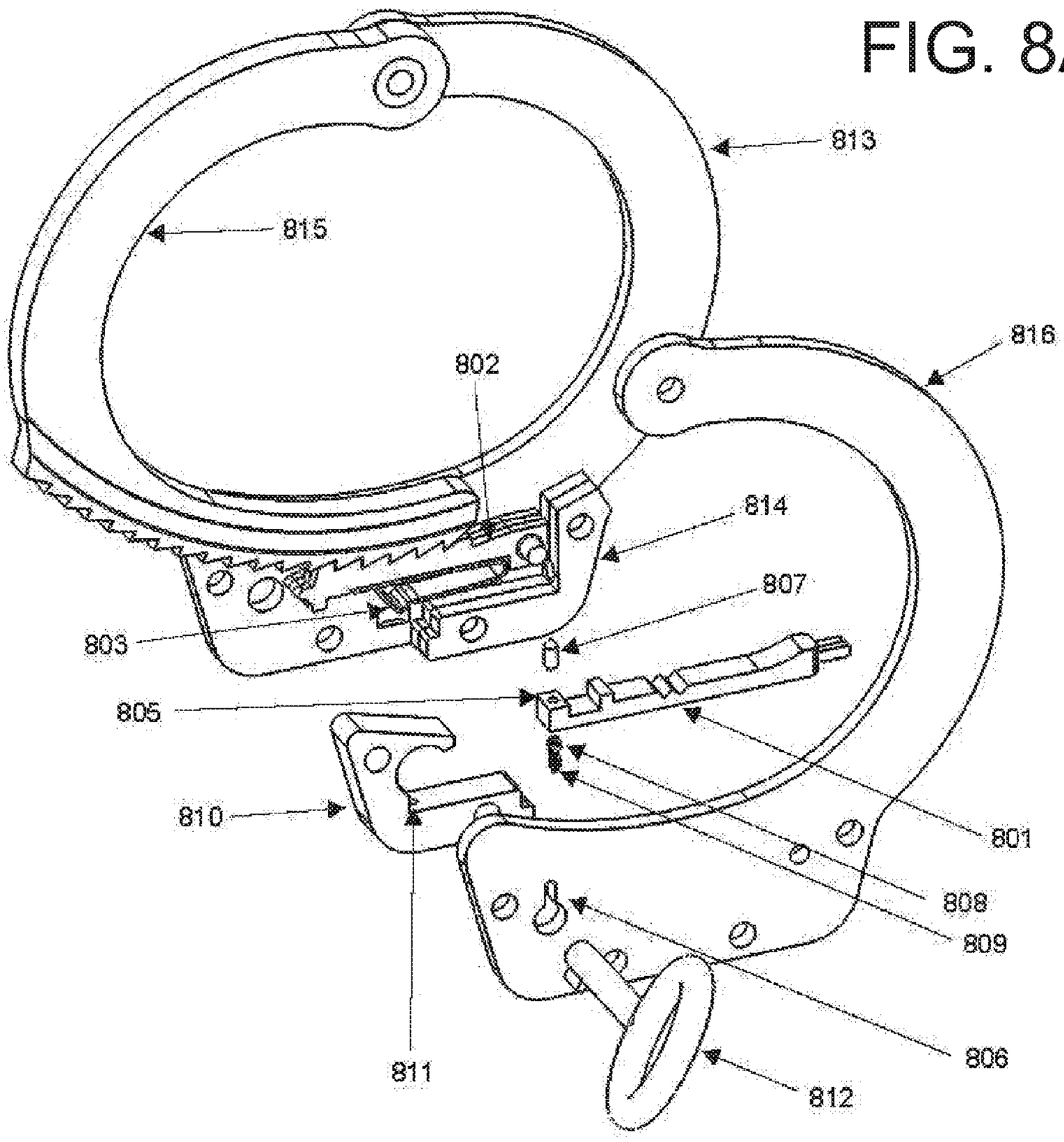



FIG. 7F

FIG. 8A



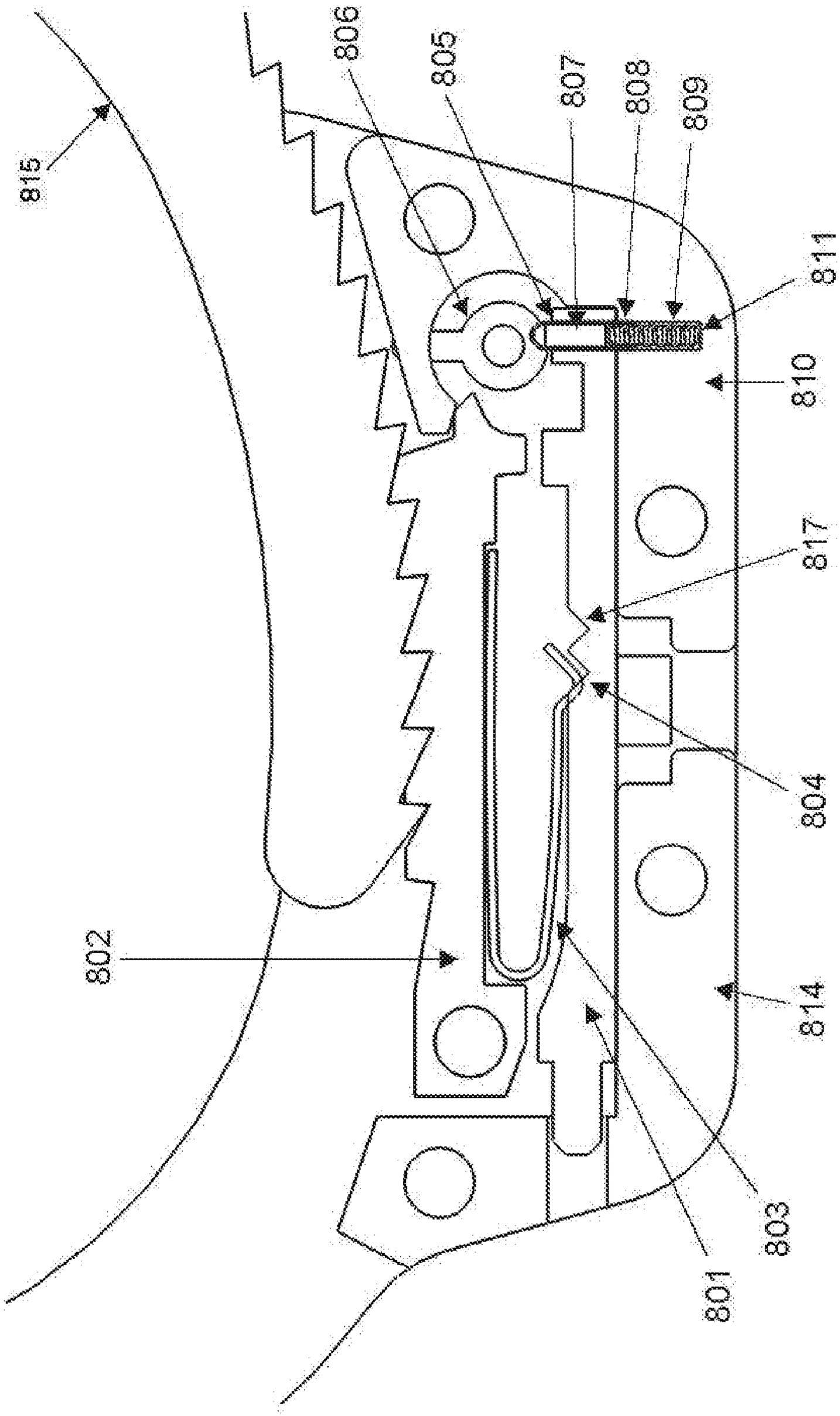



FIG. 8B

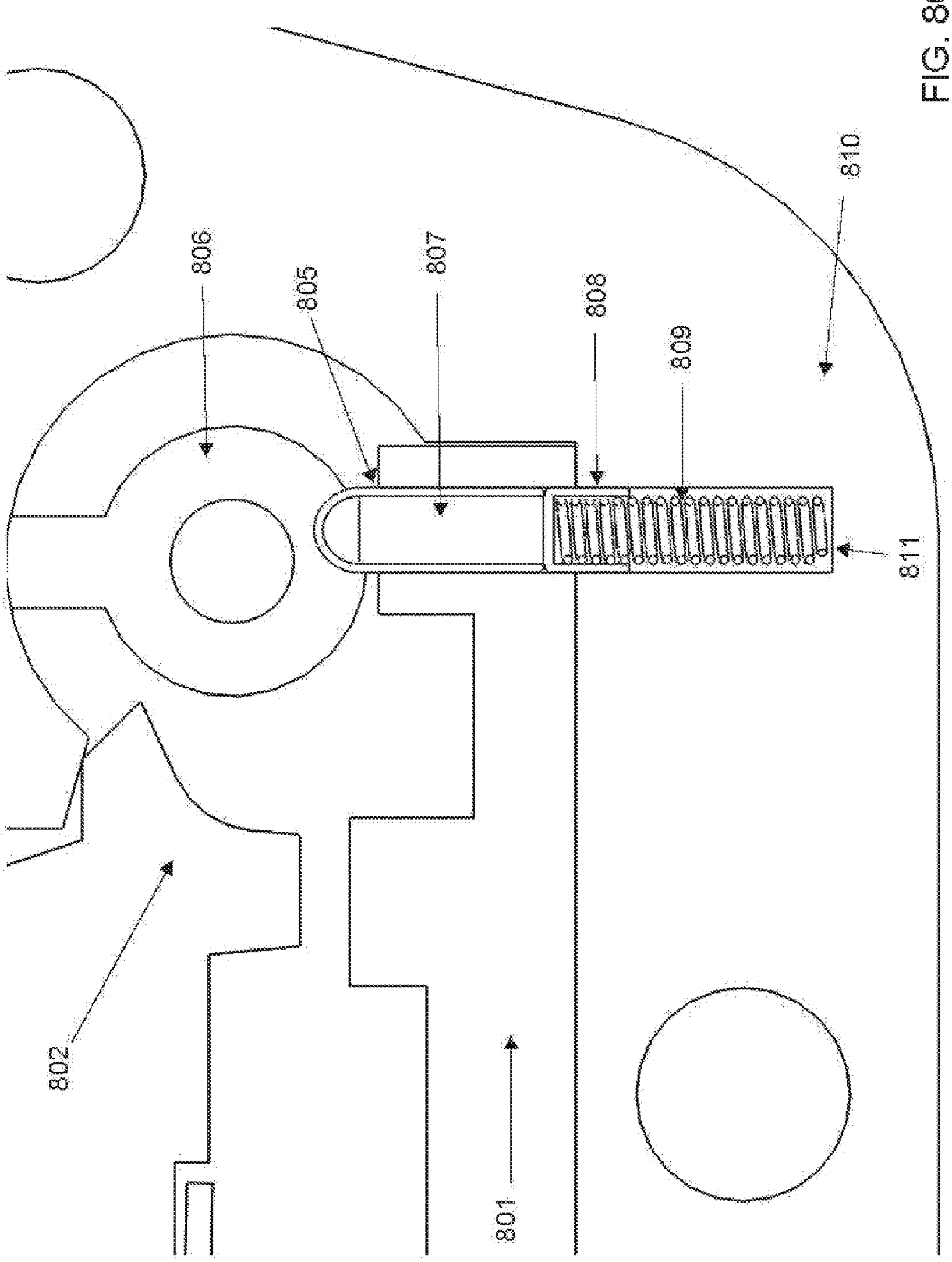



FIG. 8C

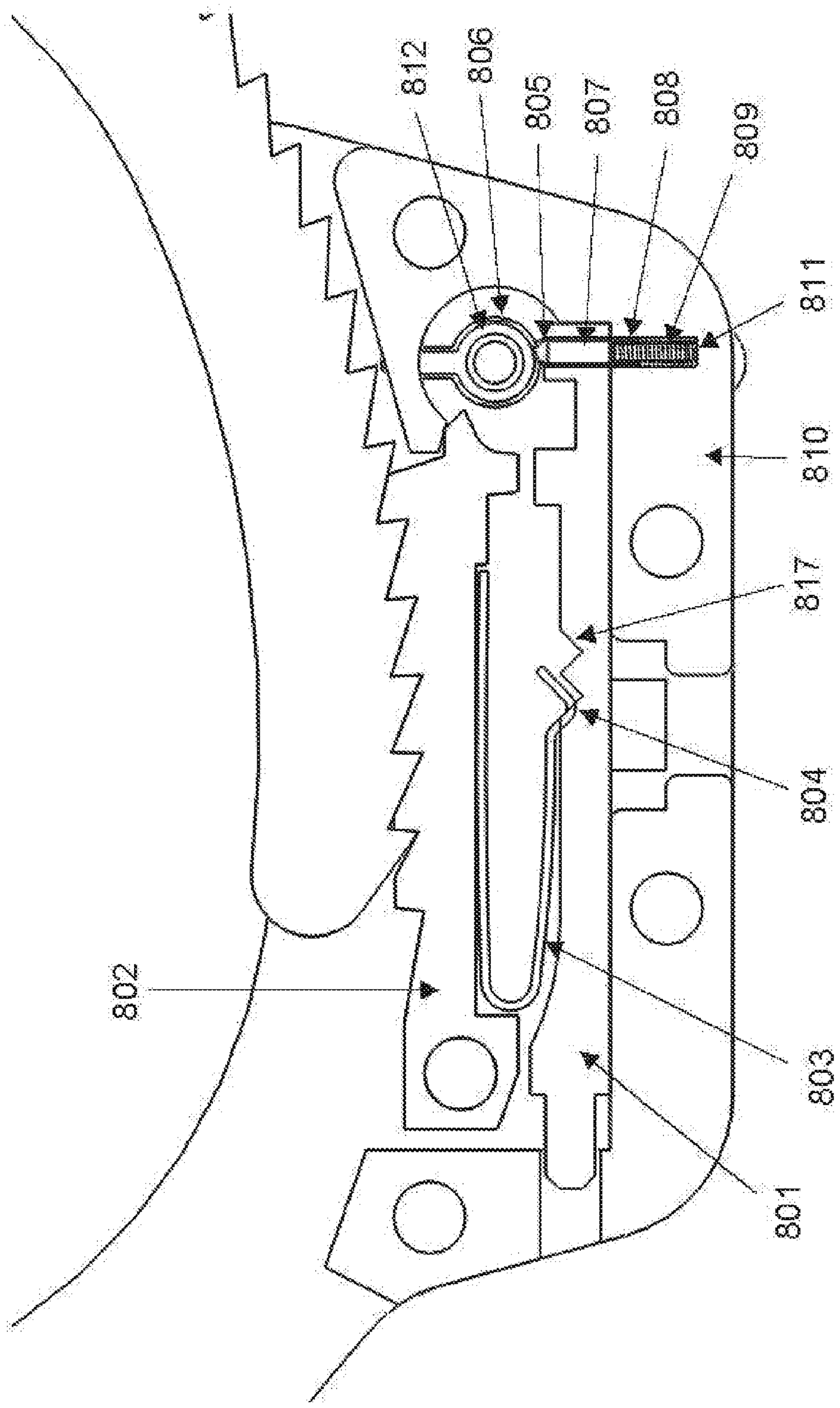



FIG. 8D

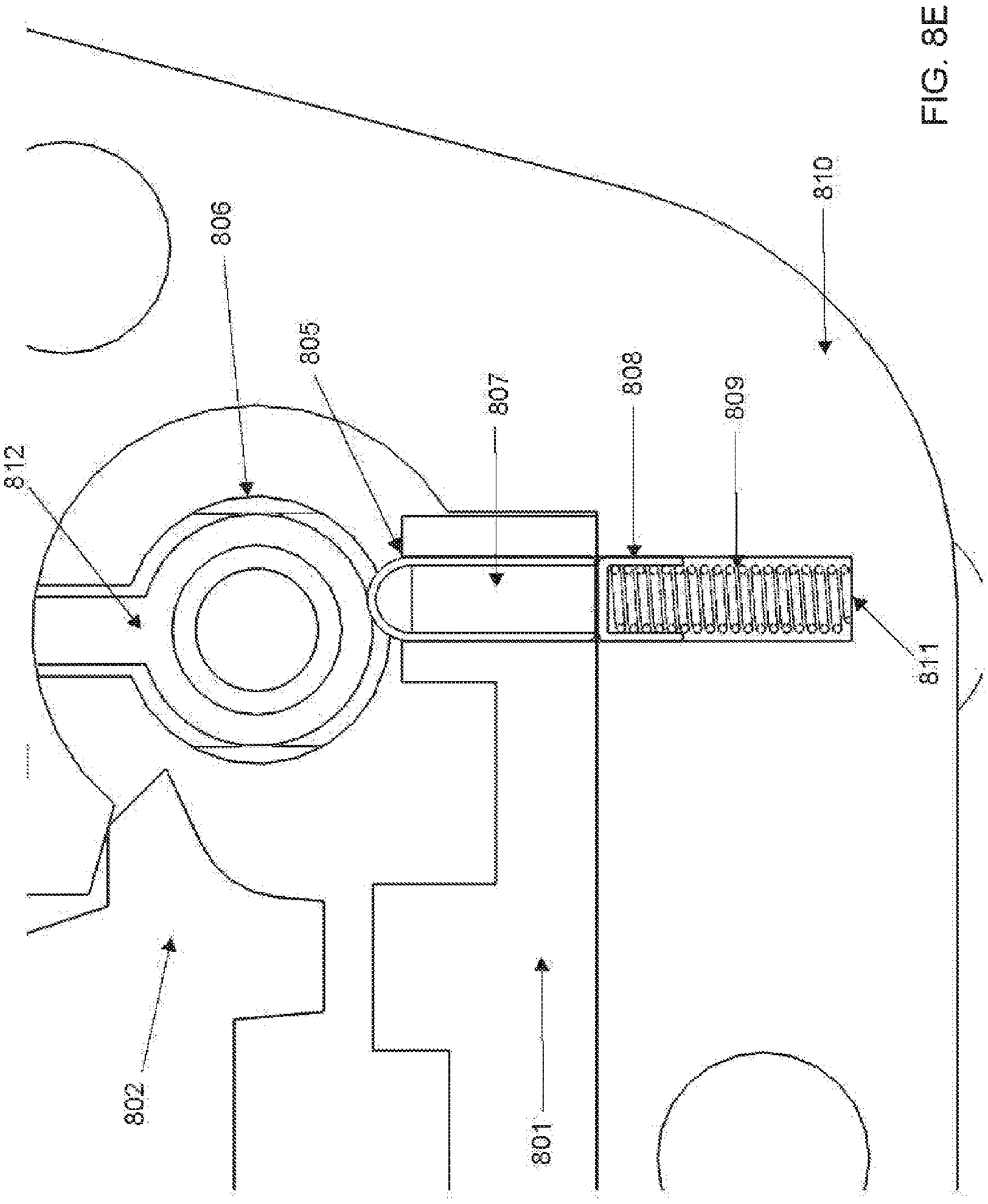



FIG. 8E

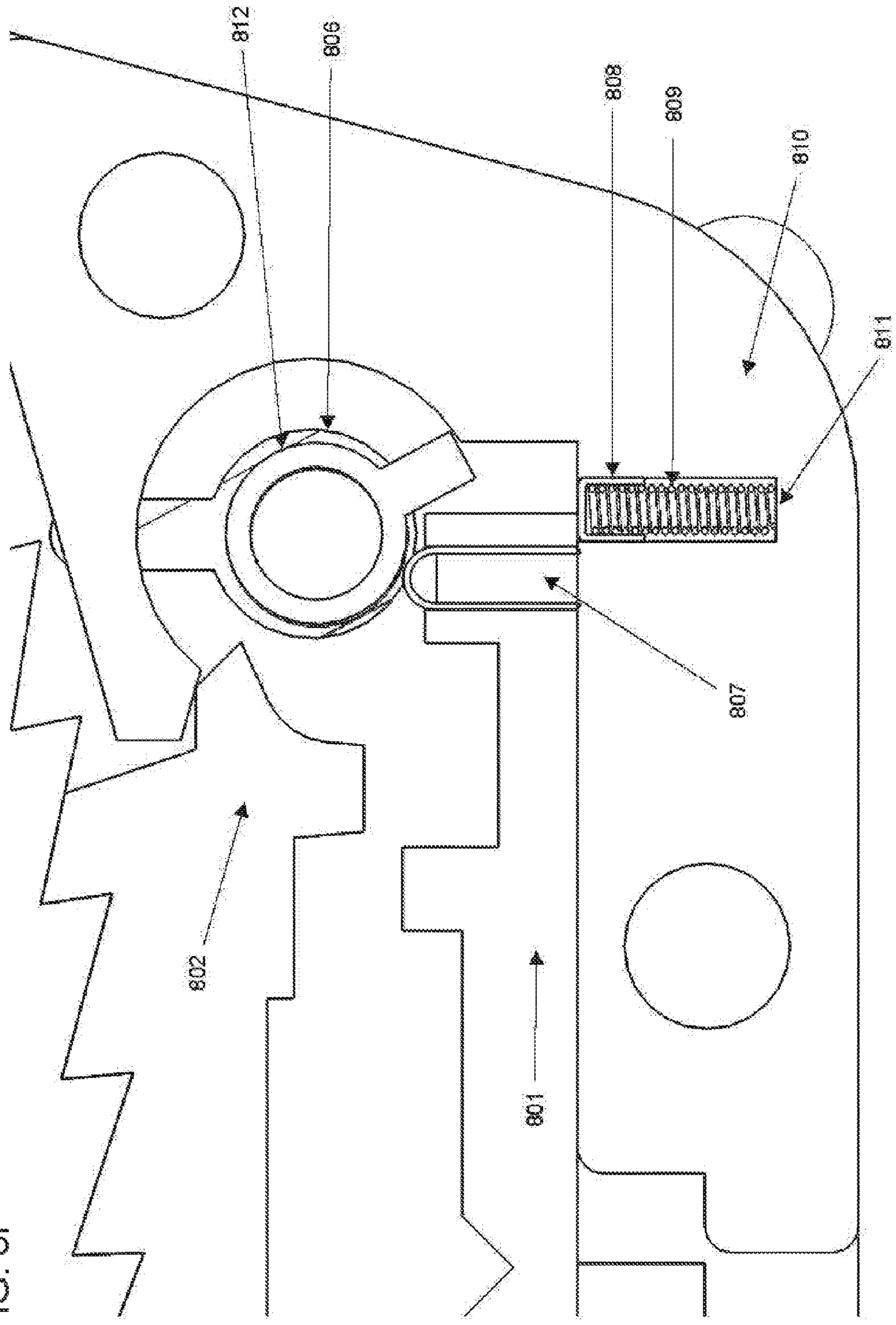



FIG. 8F

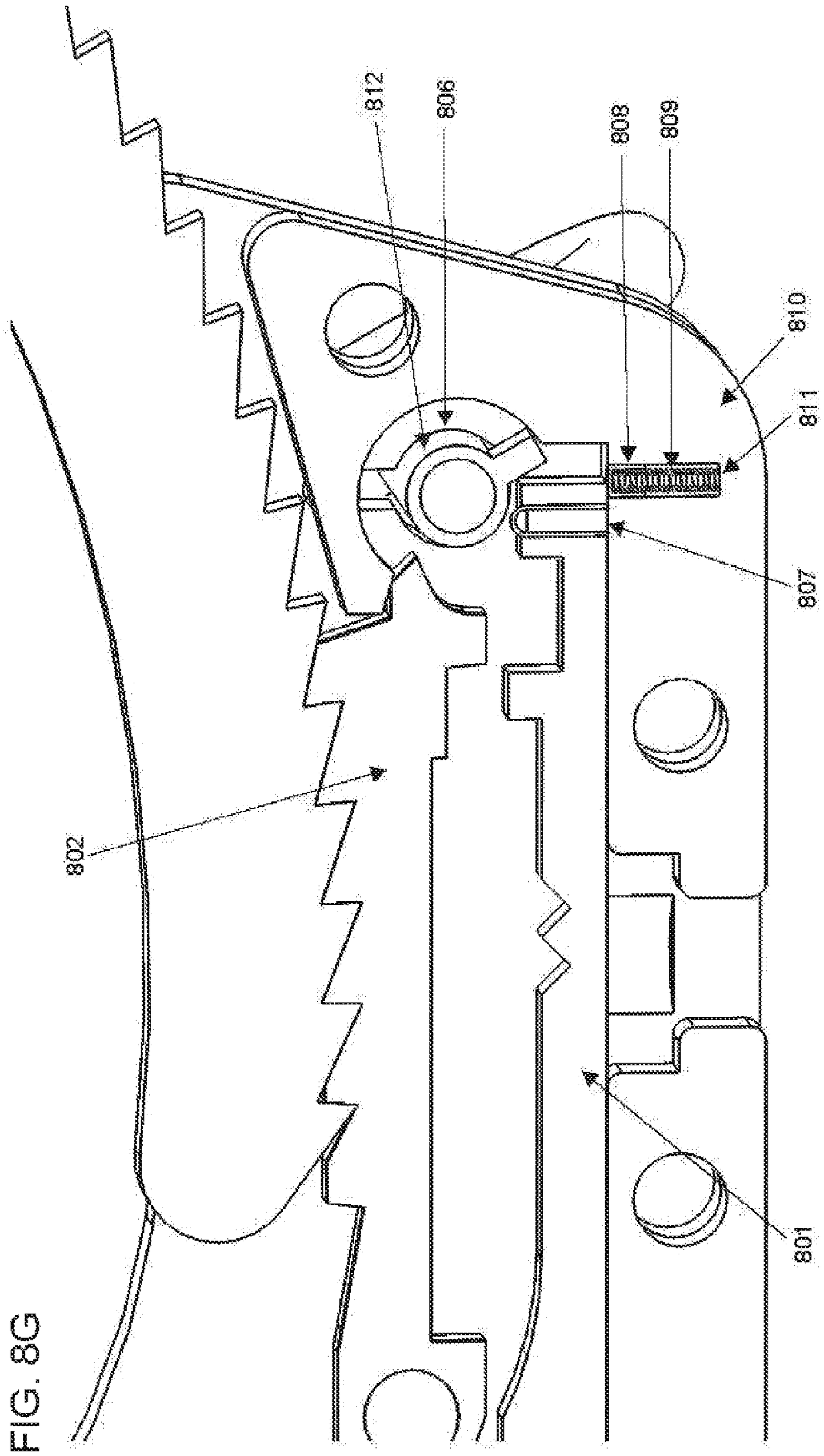



FIG. 8G

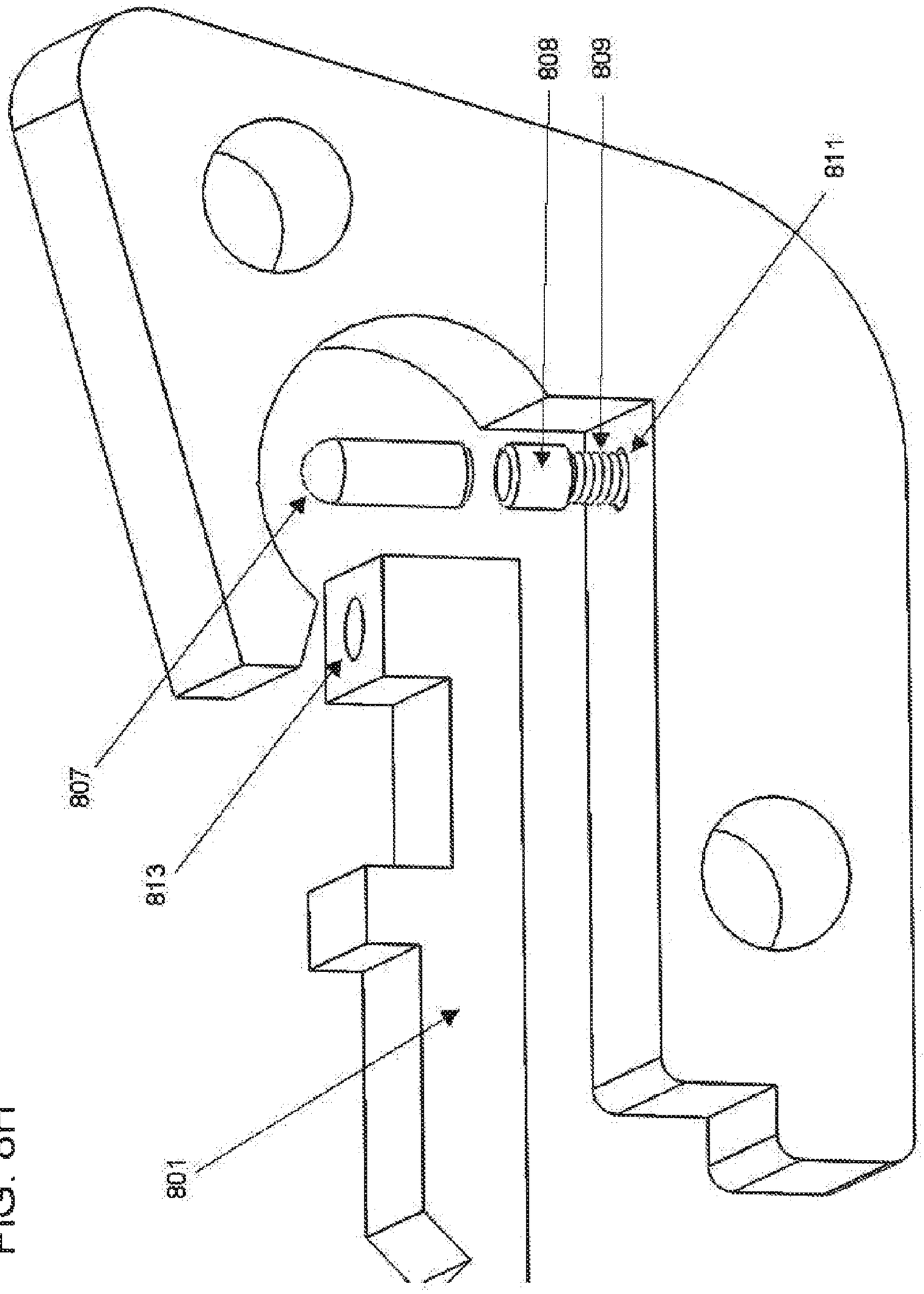



FIG. 8H

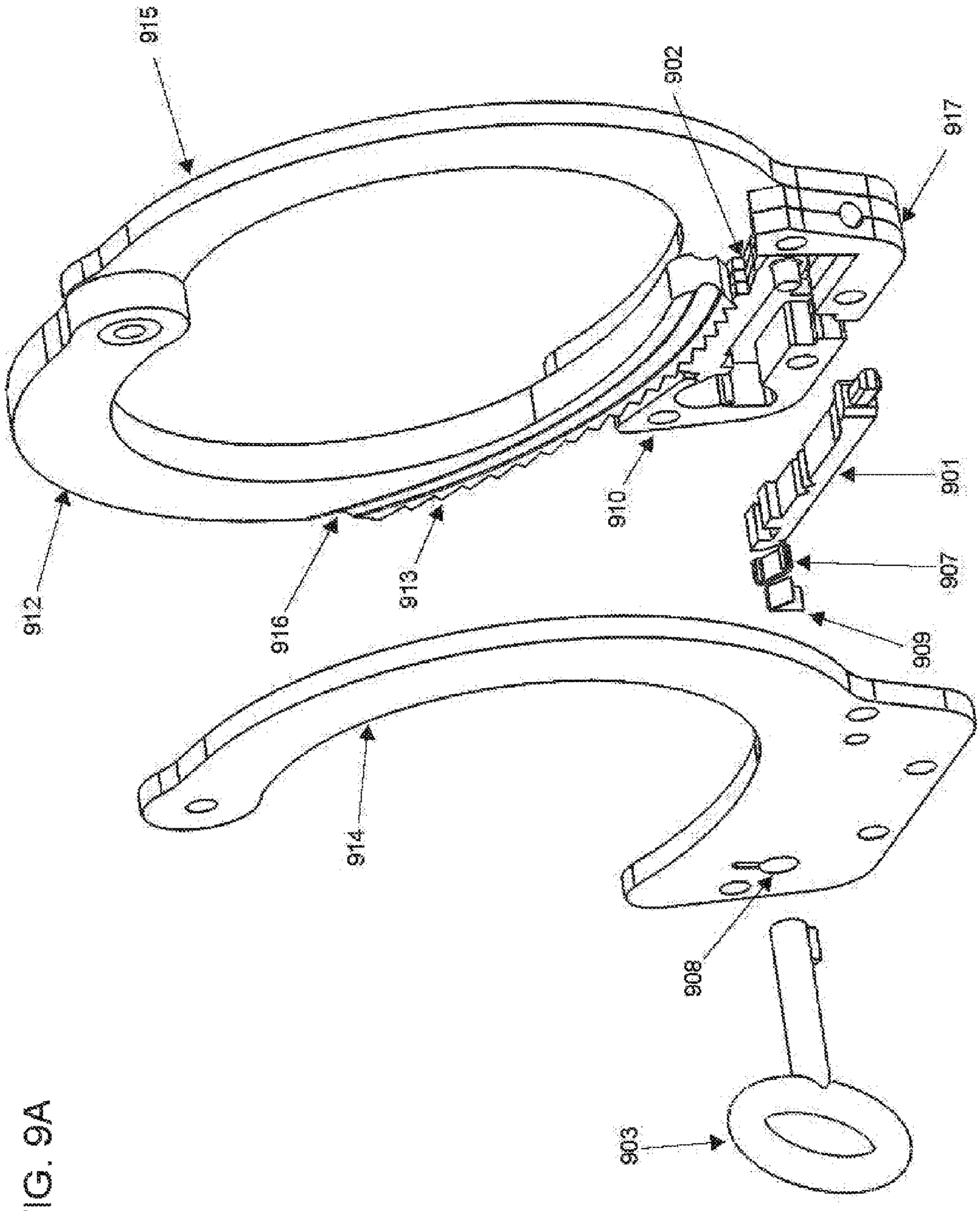



FIG. 9A

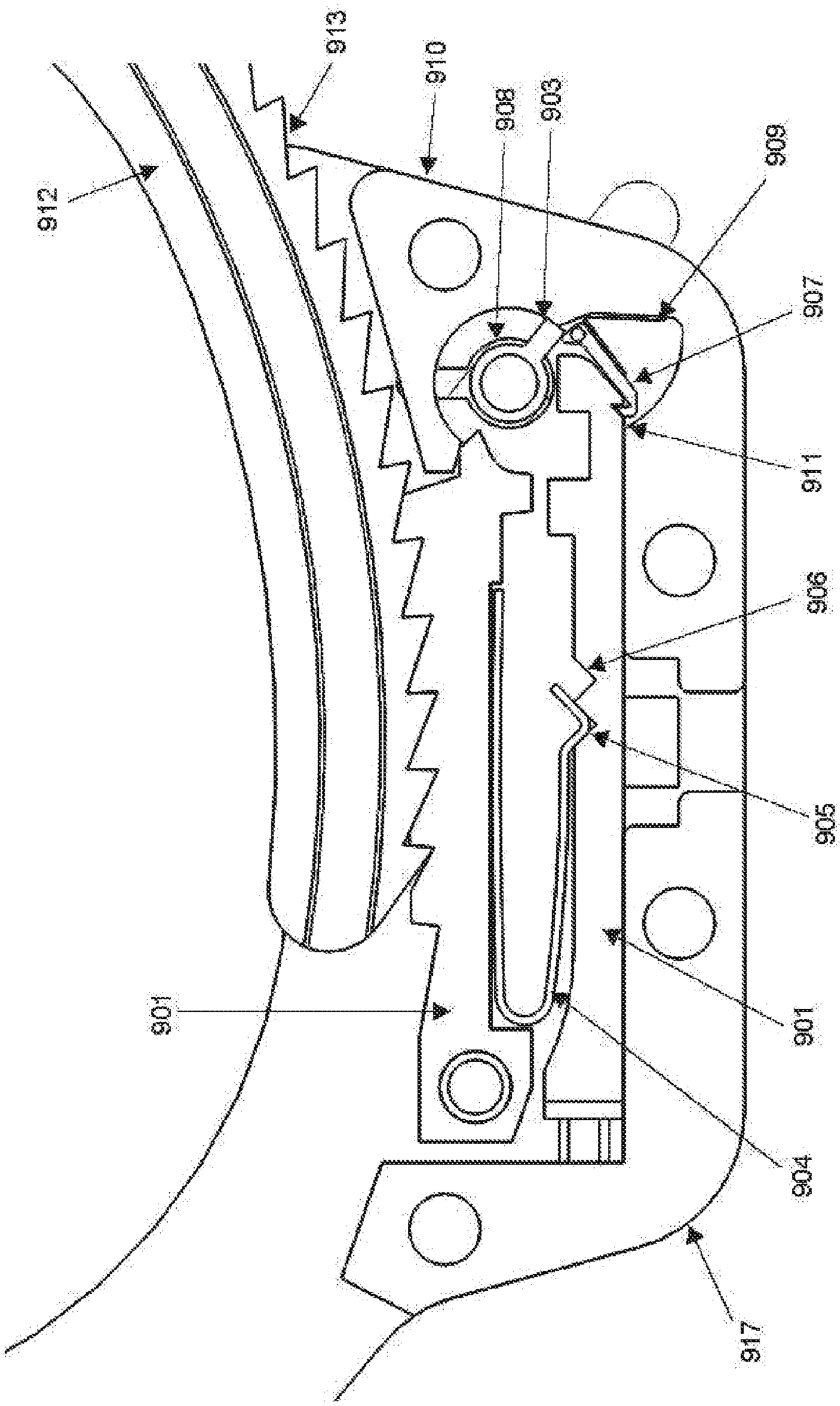



FIG. 9B

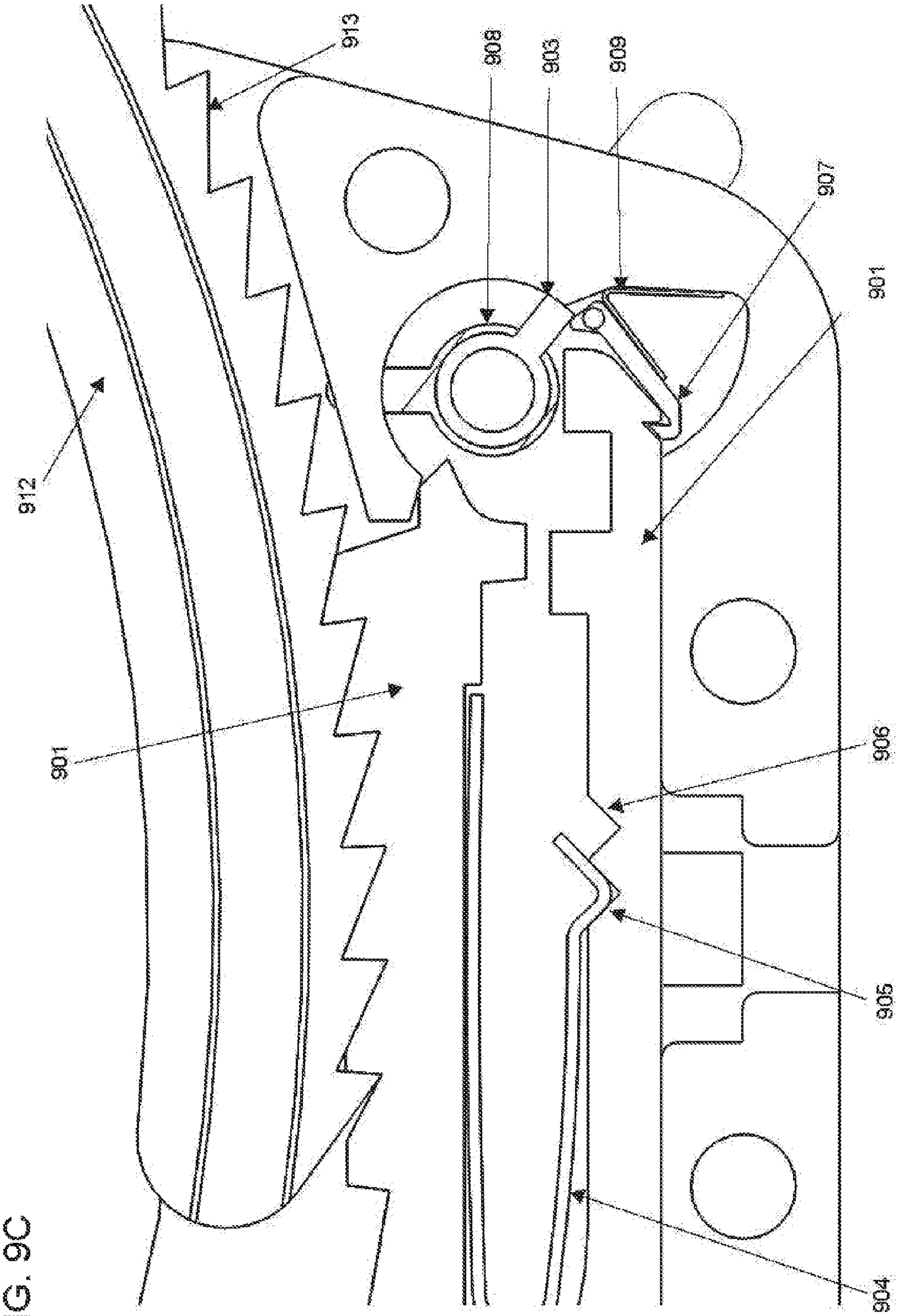



FIG. 9C

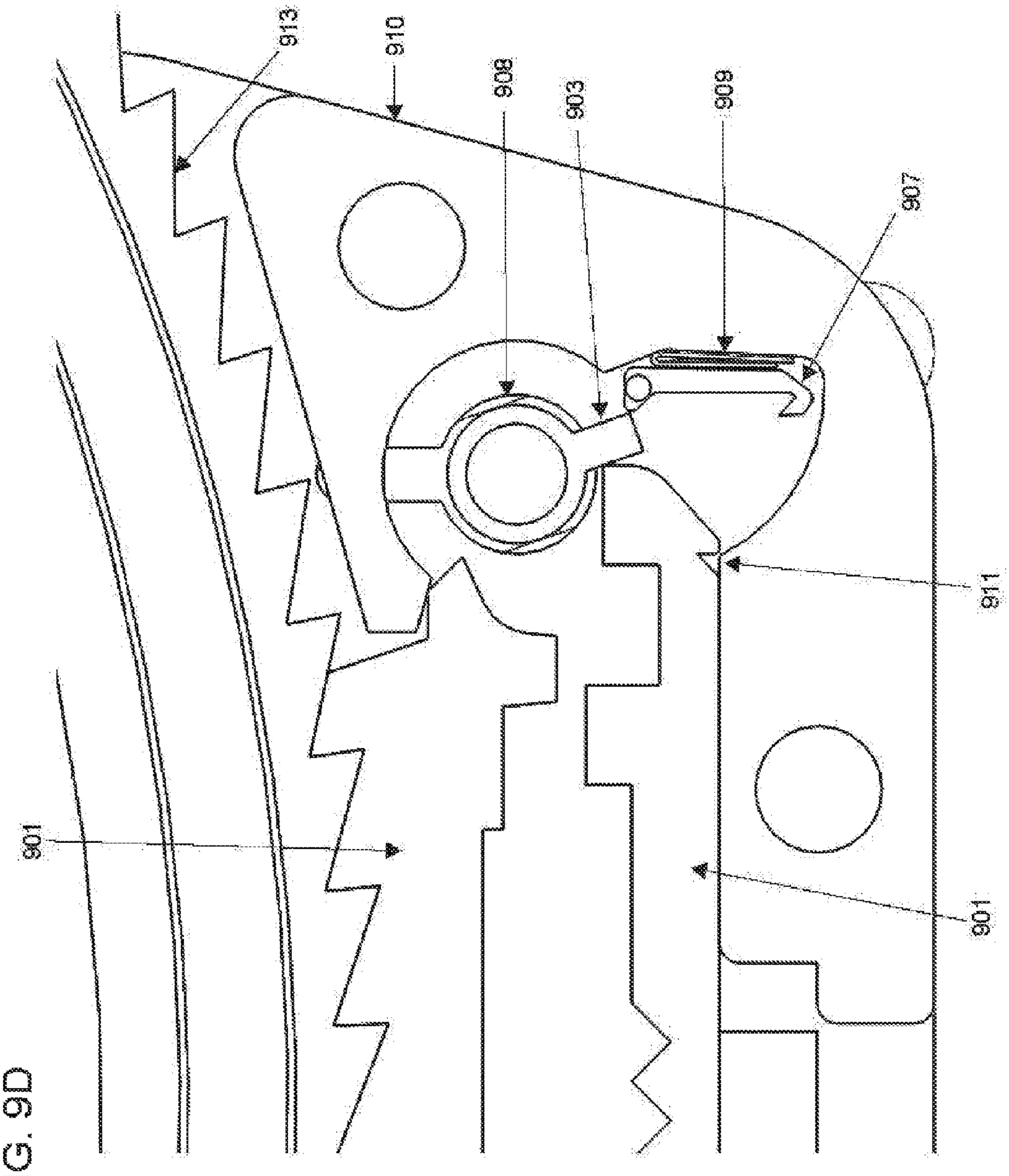



FIG. 9D

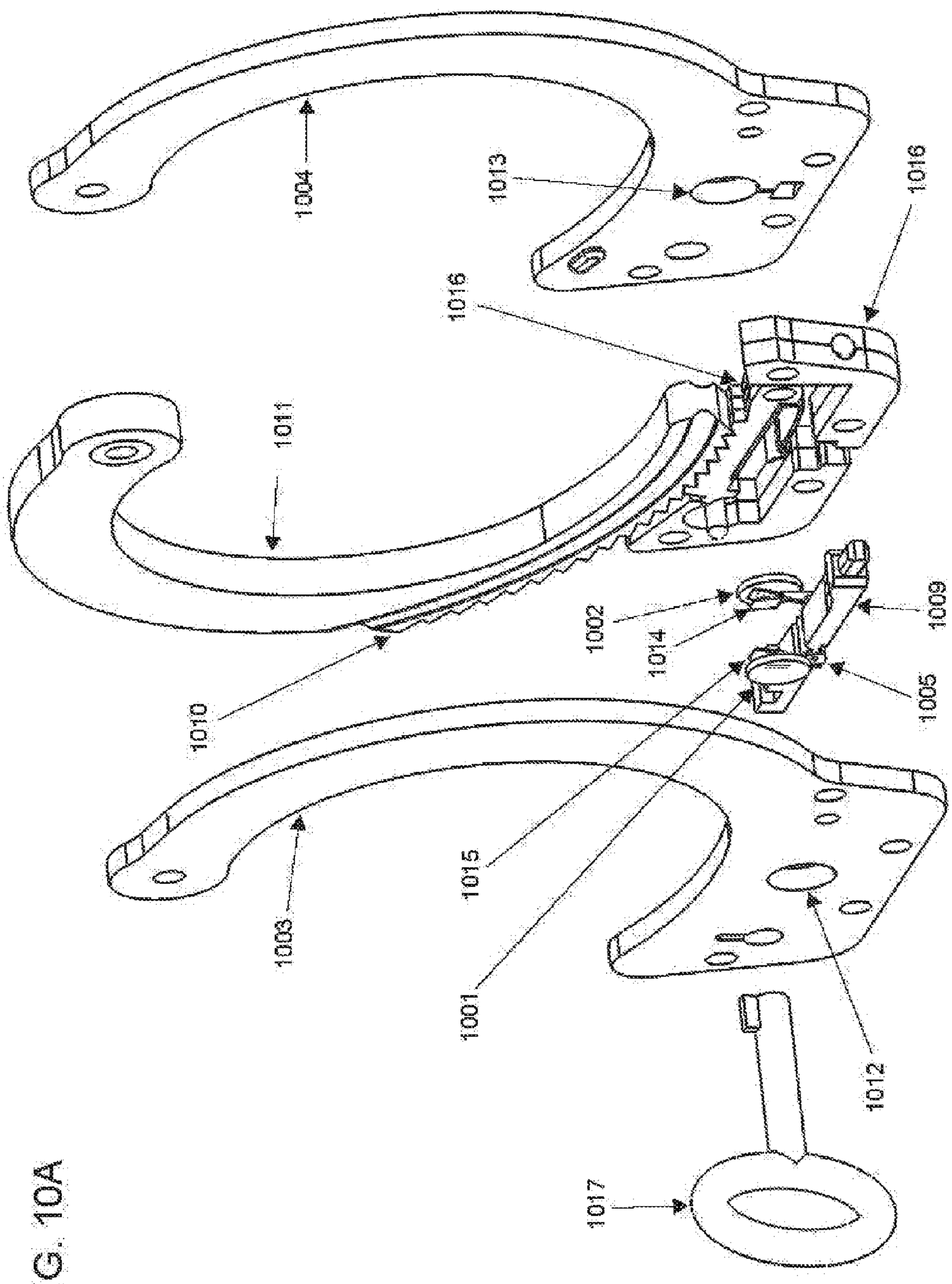

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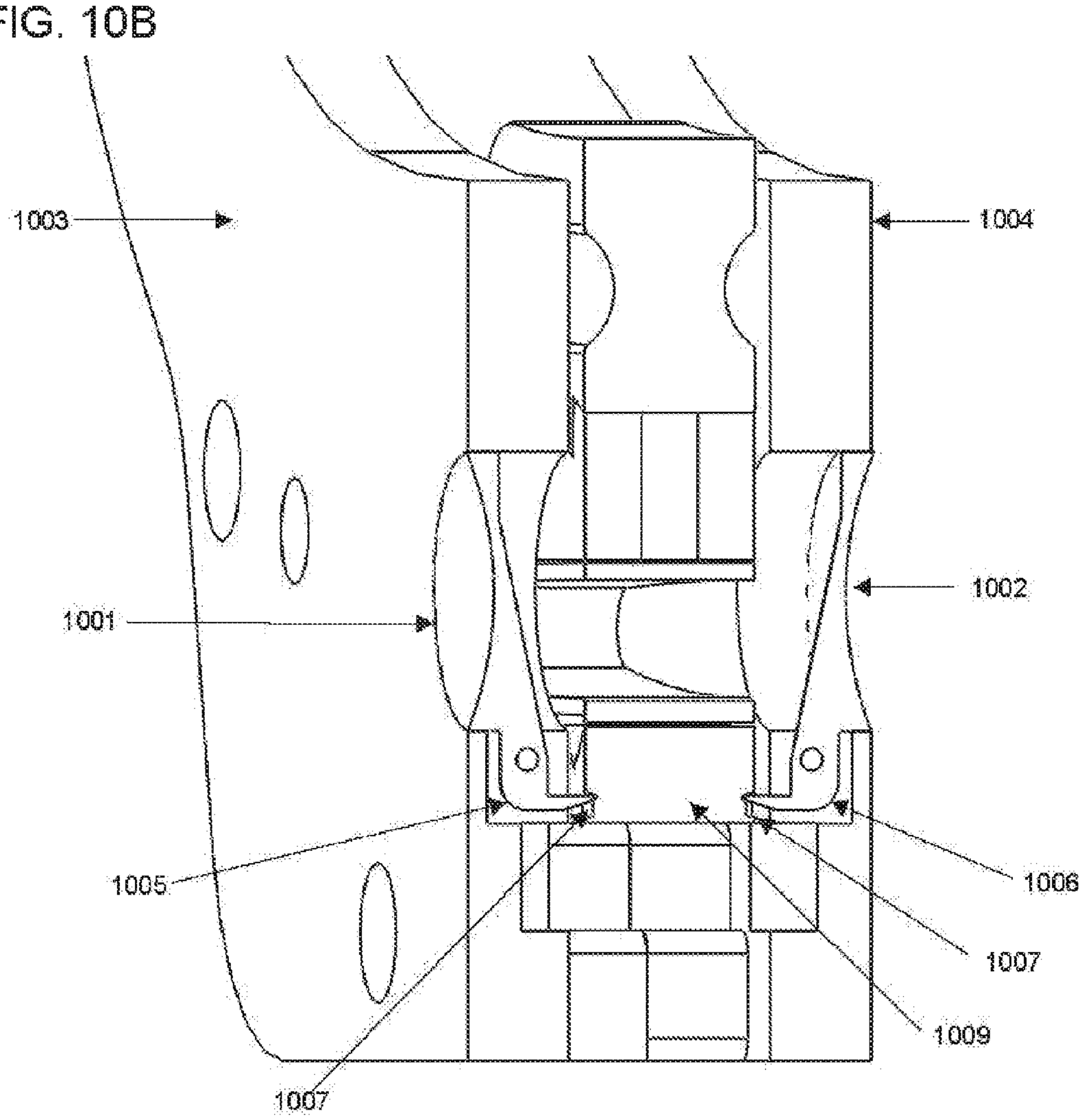
FIG. 10A

FIG. 10B



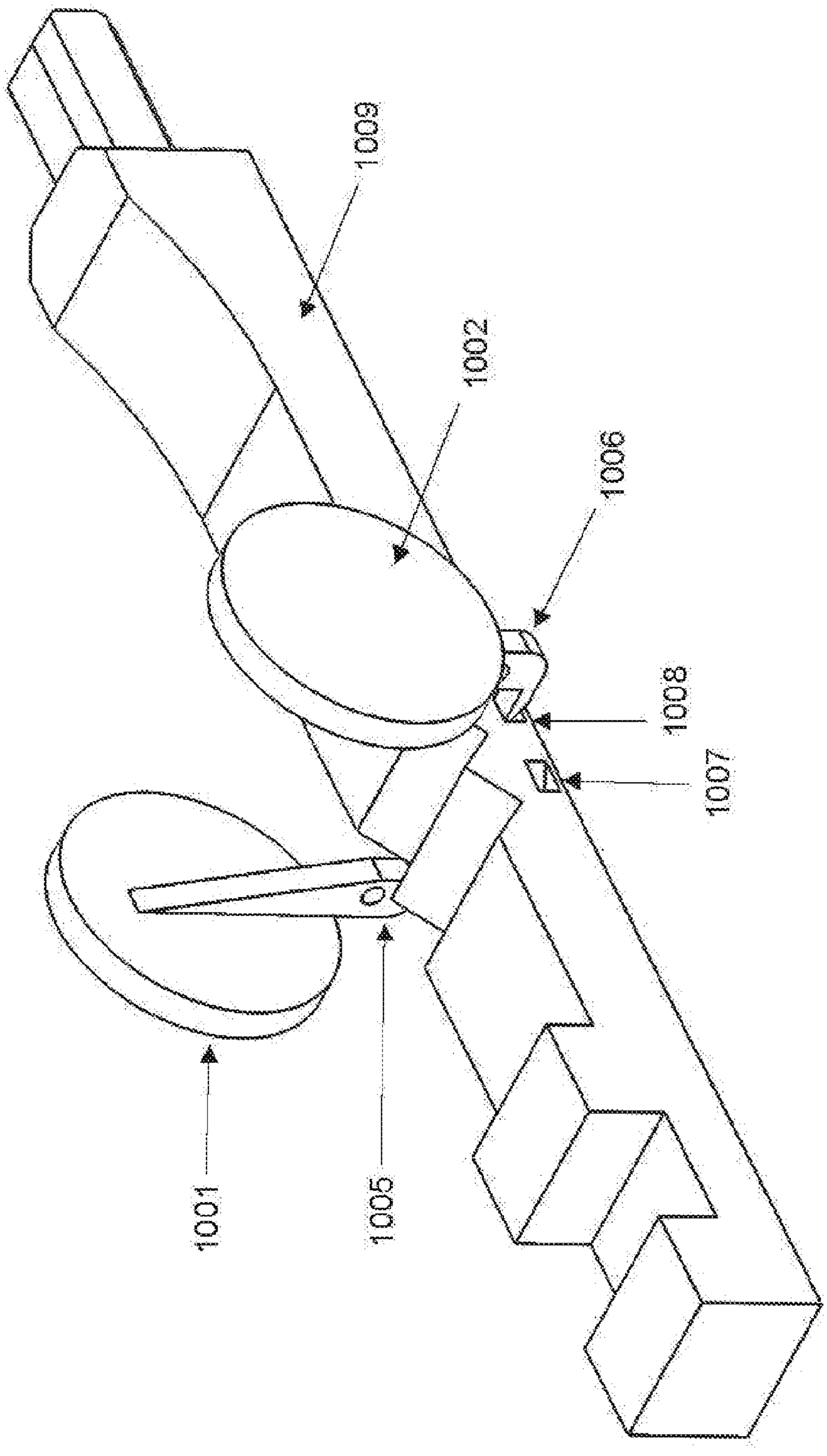
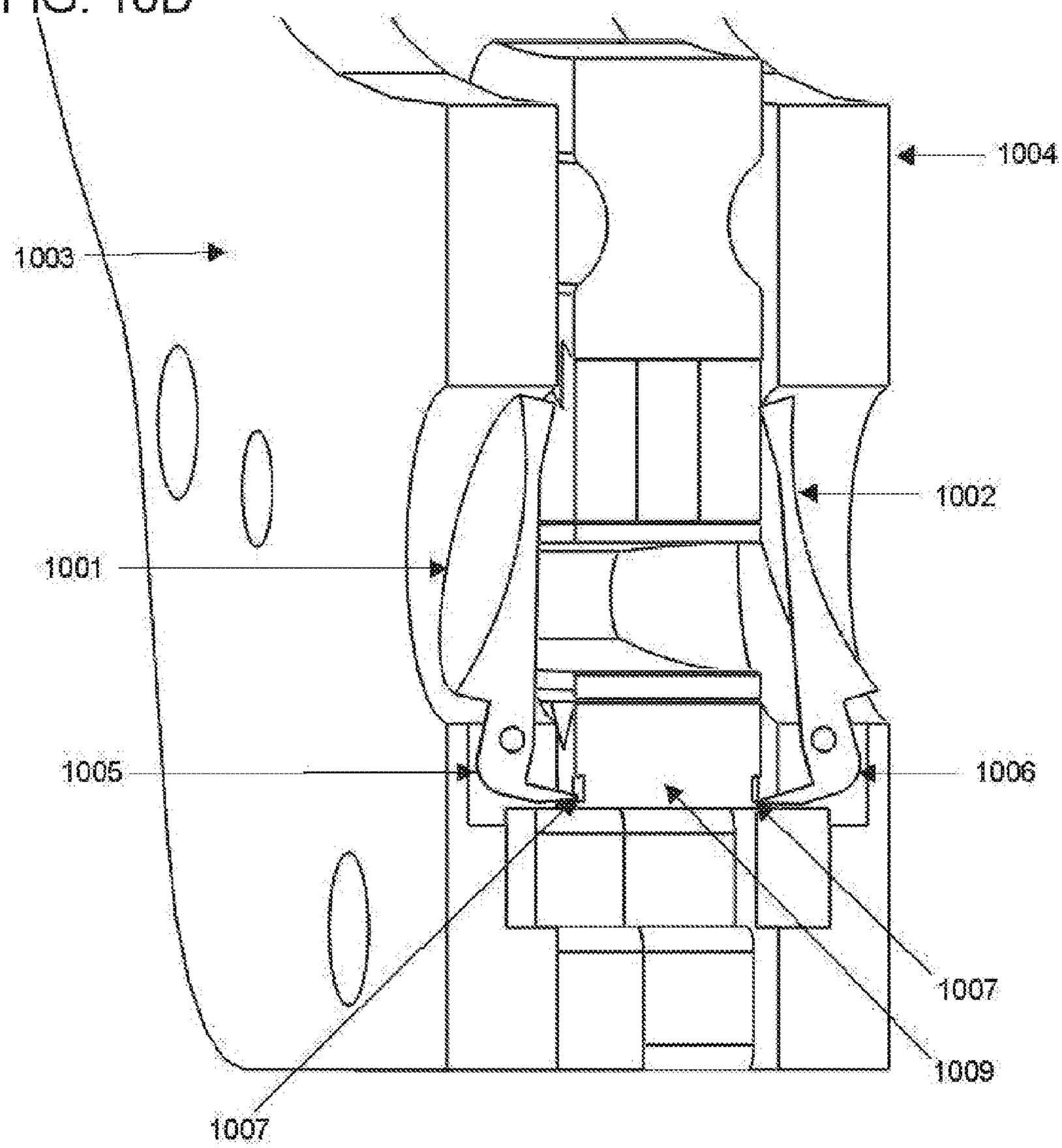



FIG. 10C

FIG. 10D



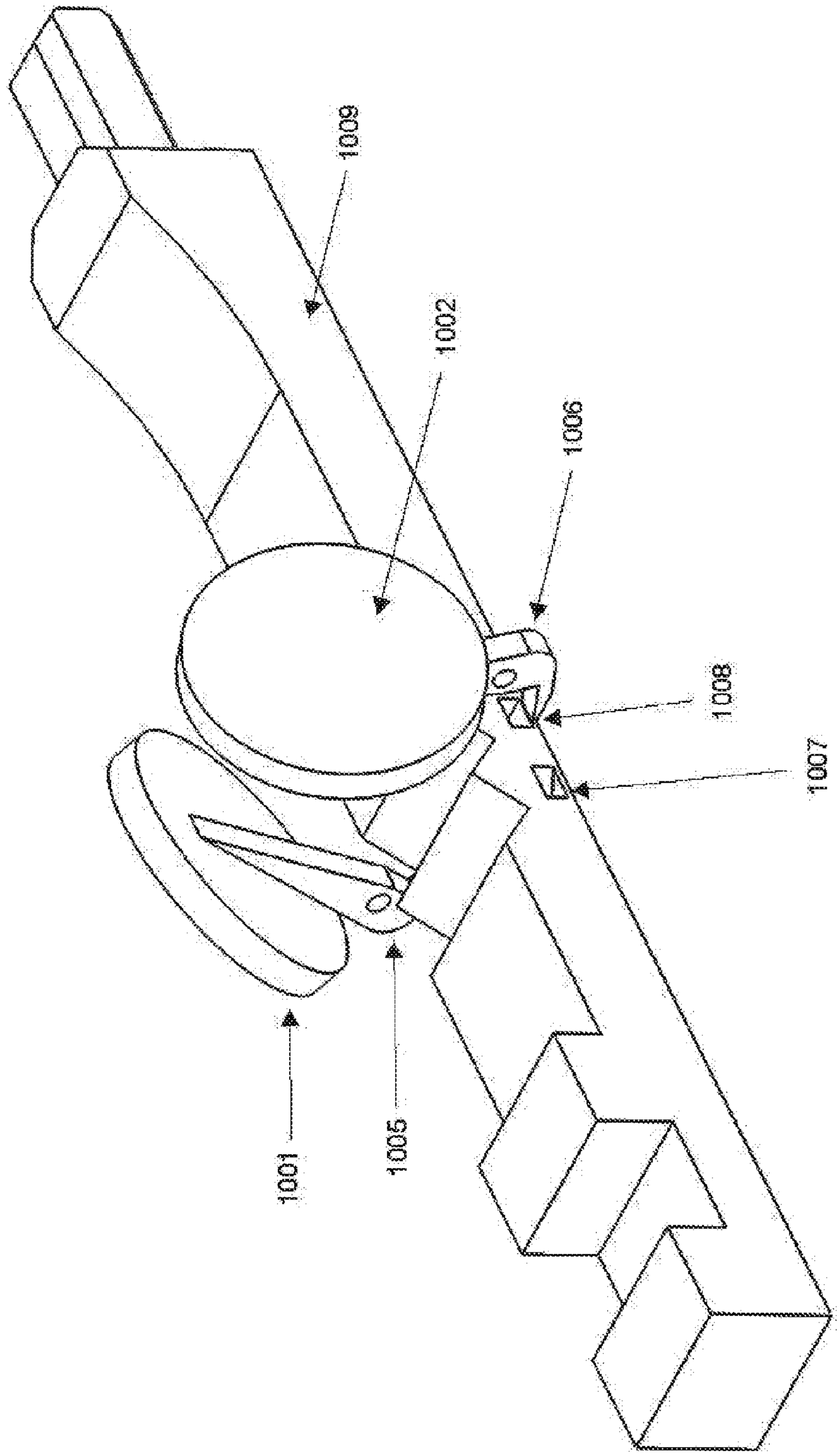



FIG. 10E

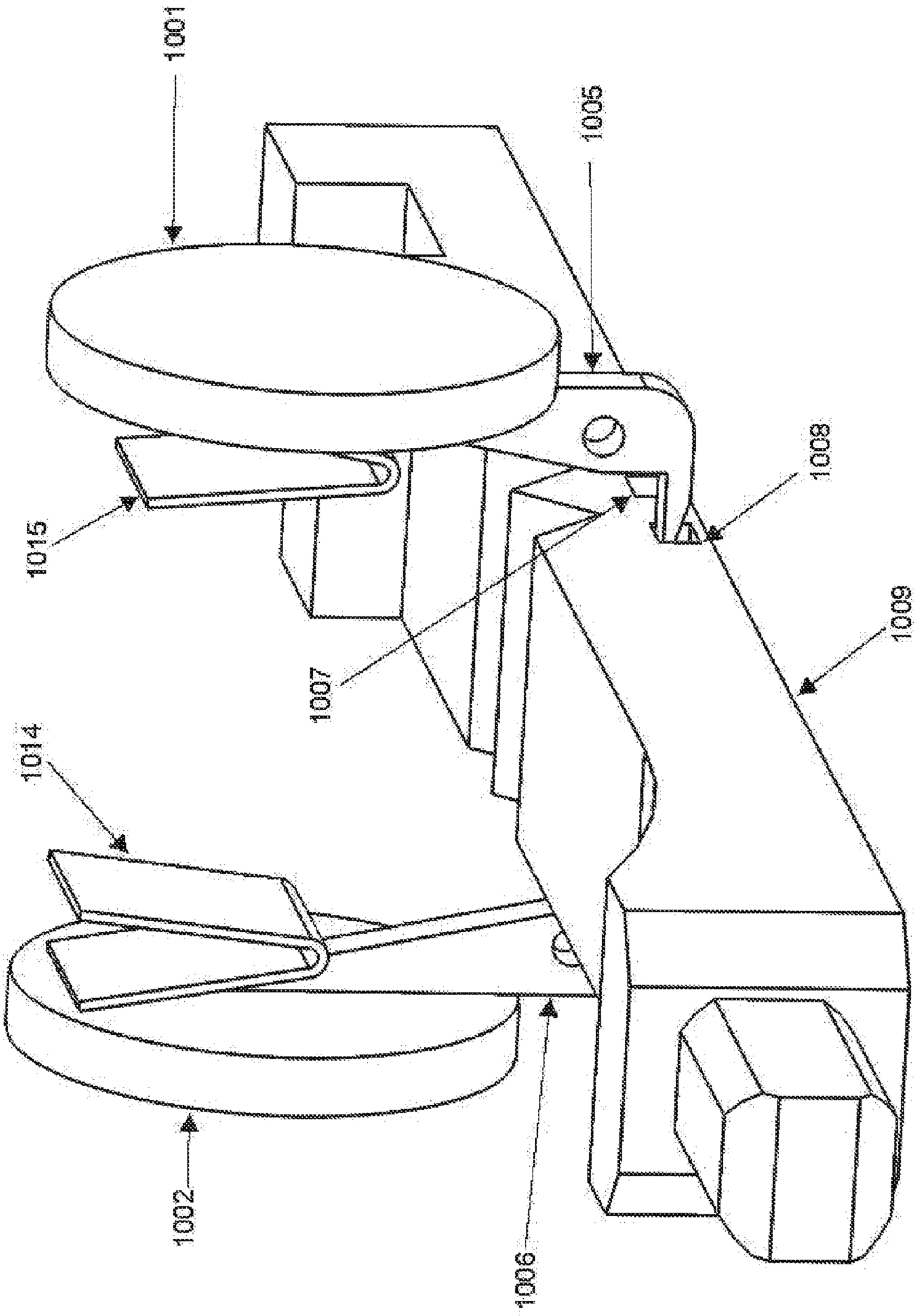



FIG. 10F

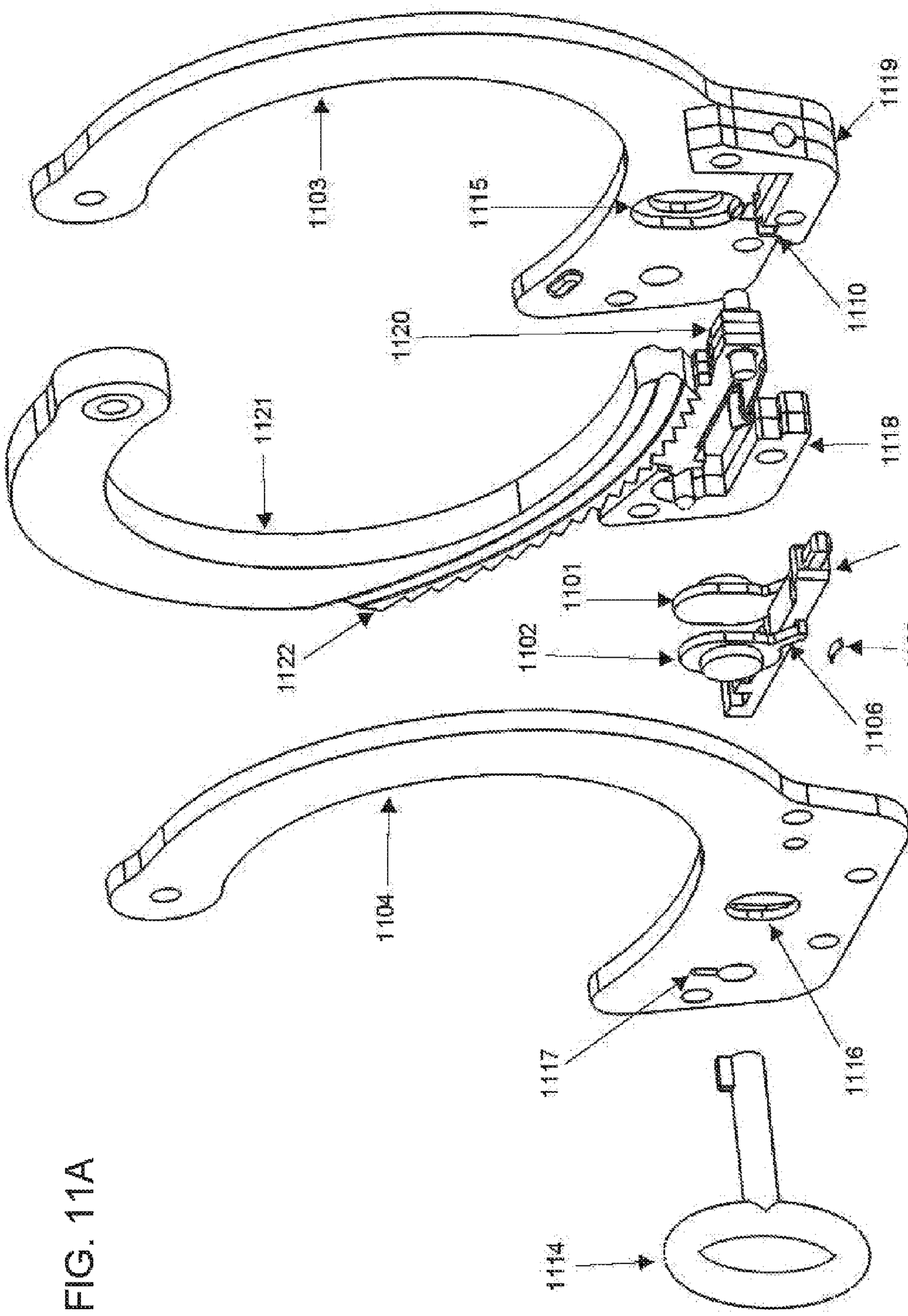

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FIG. 11A

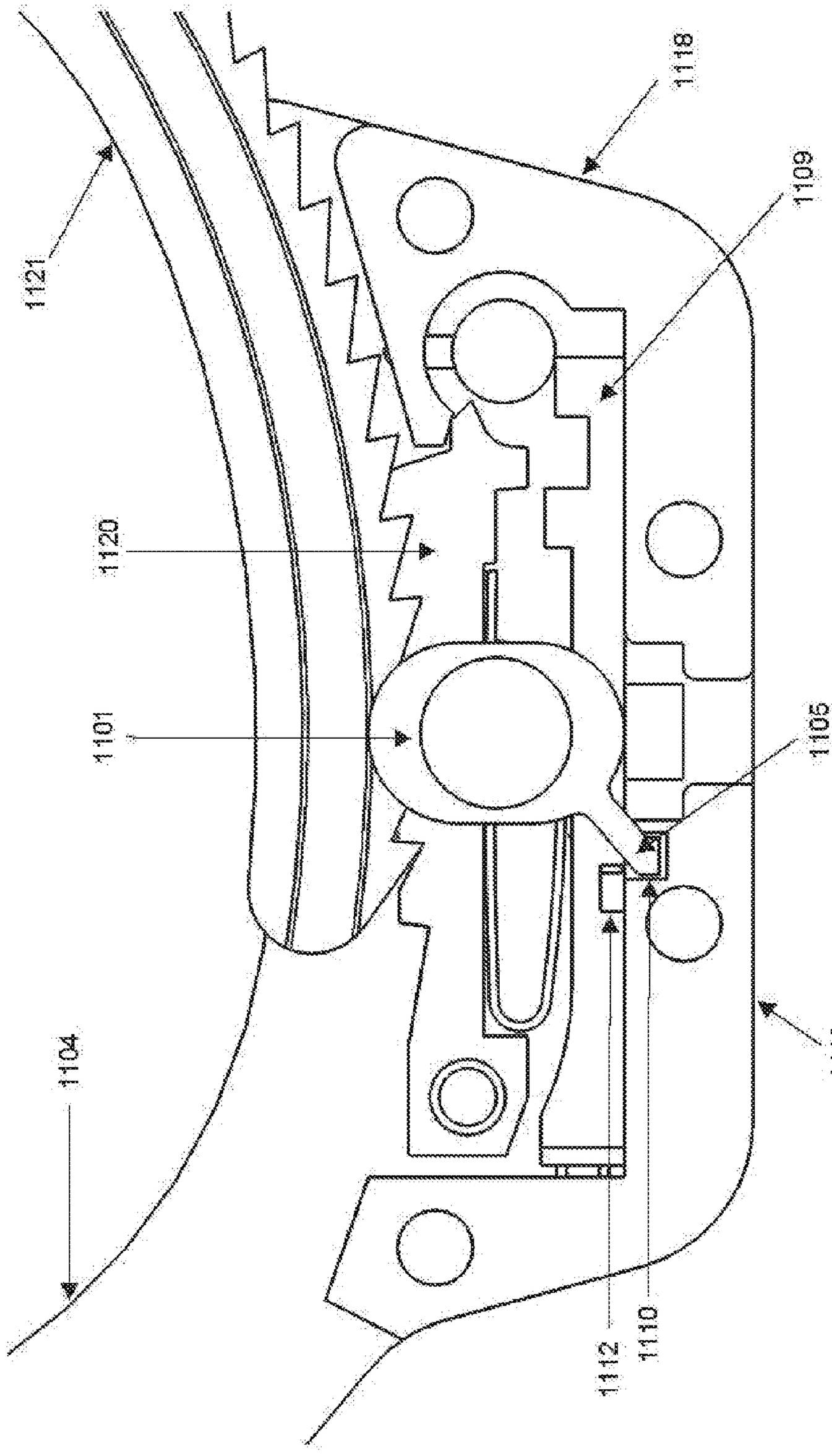



FIG. 11B

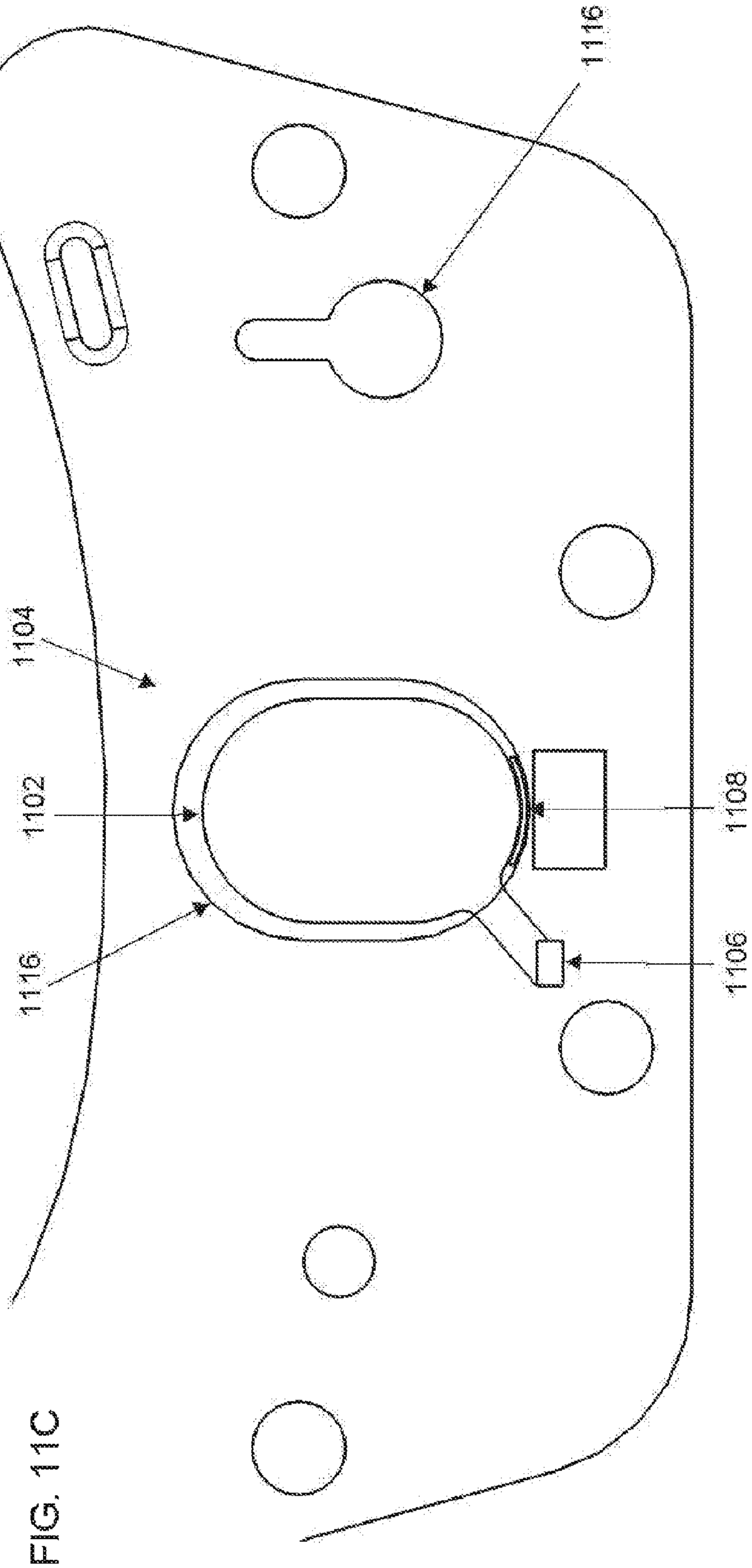



FIG. 11C

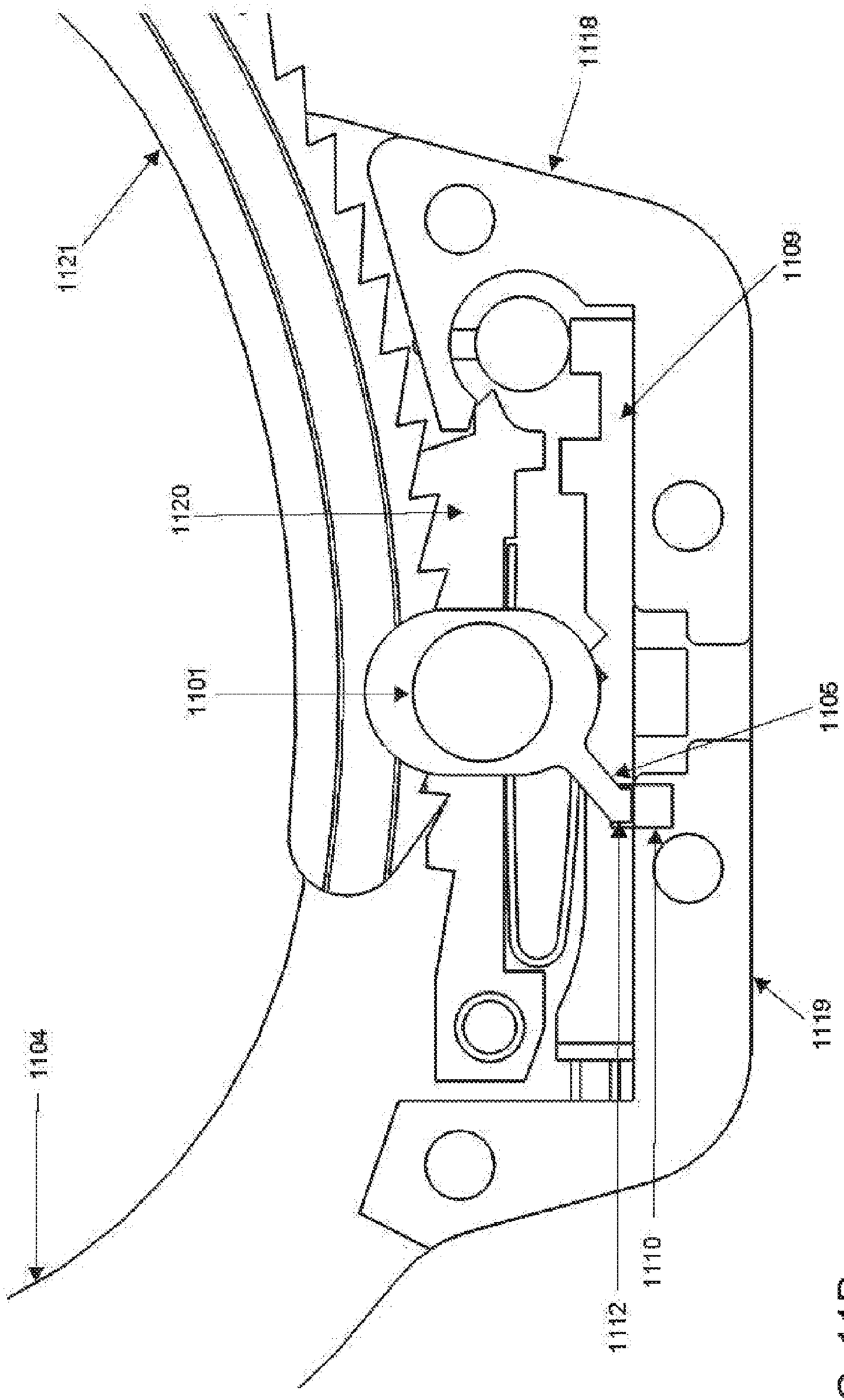



FIG. 11D

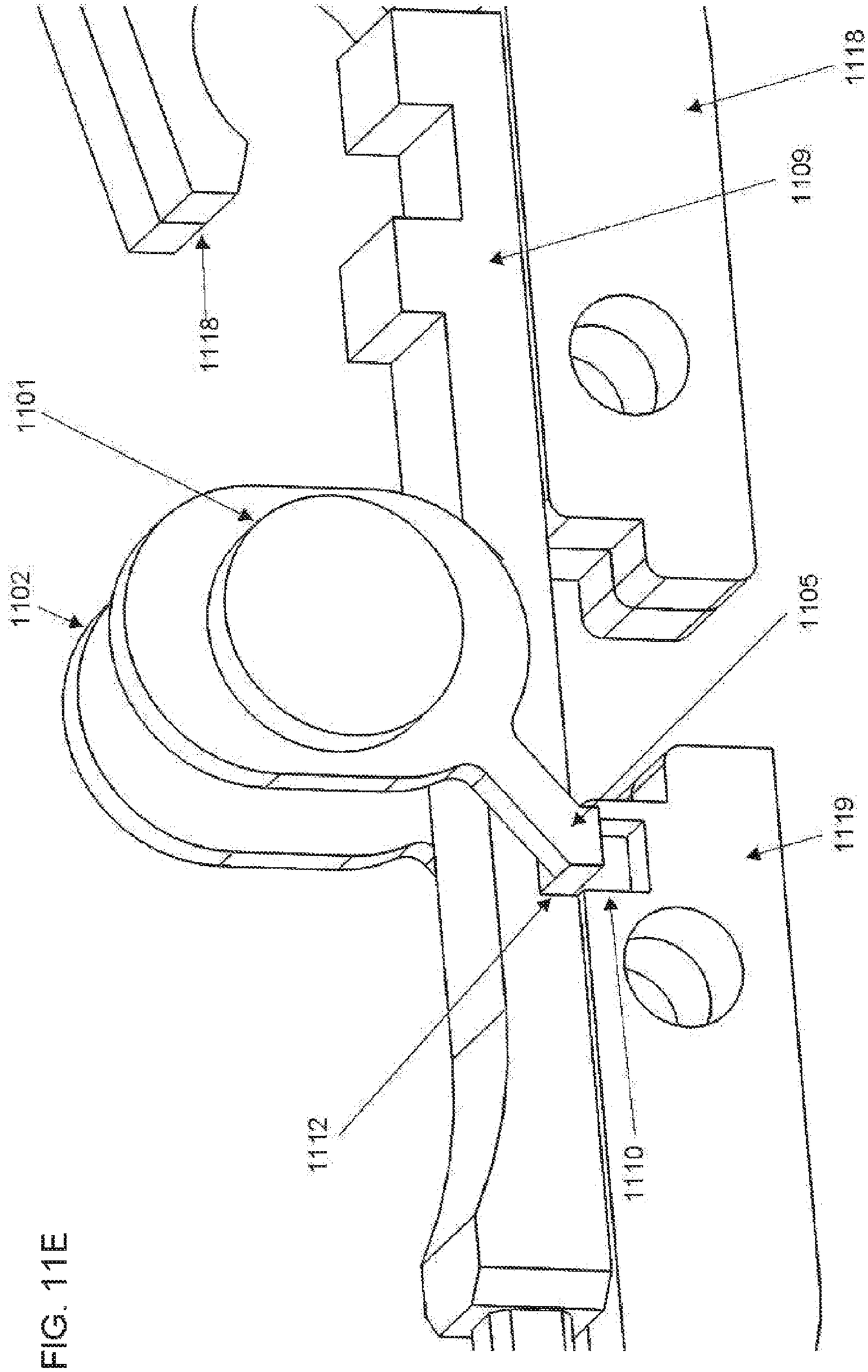



FIG. 11E

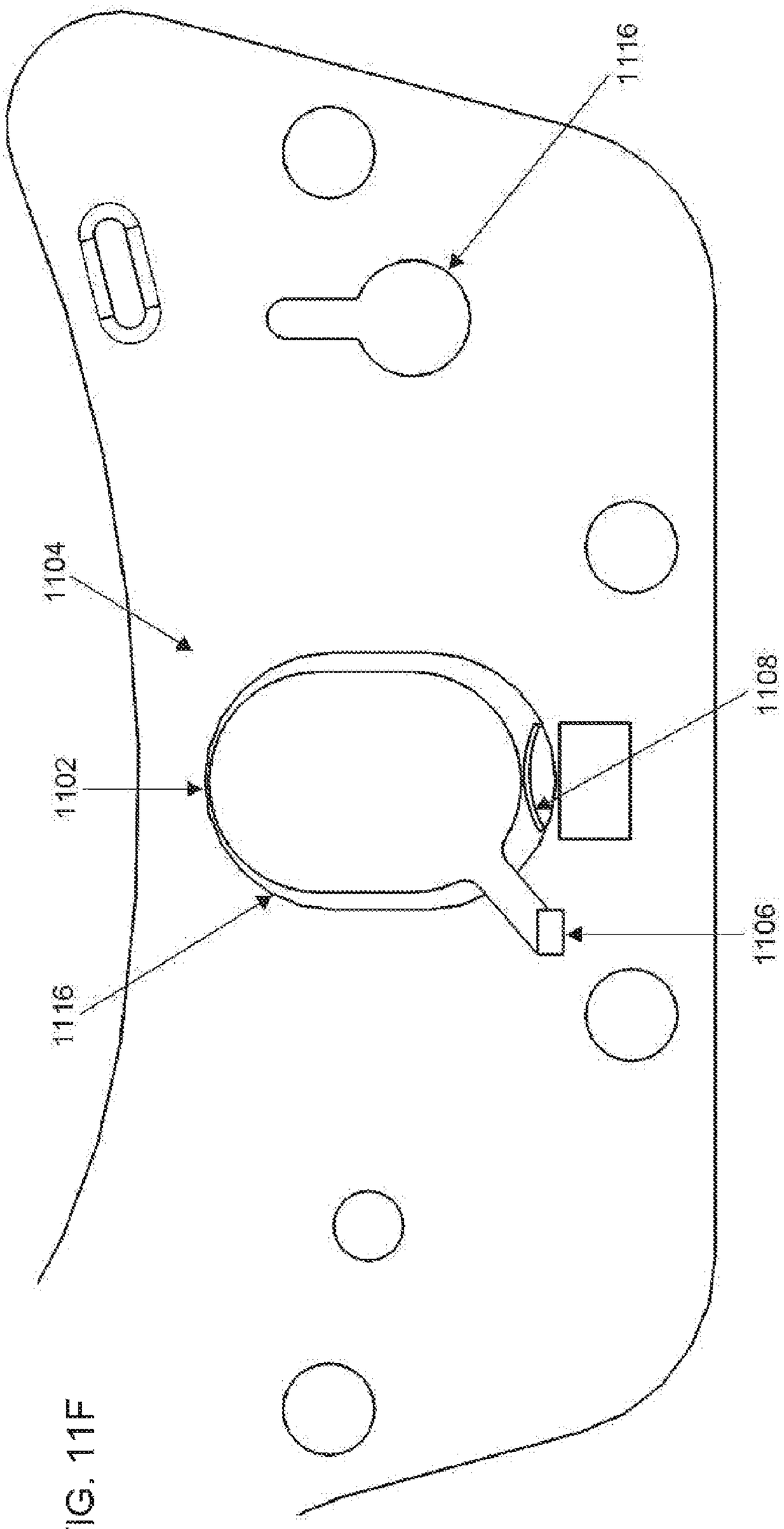



FIG. 11F

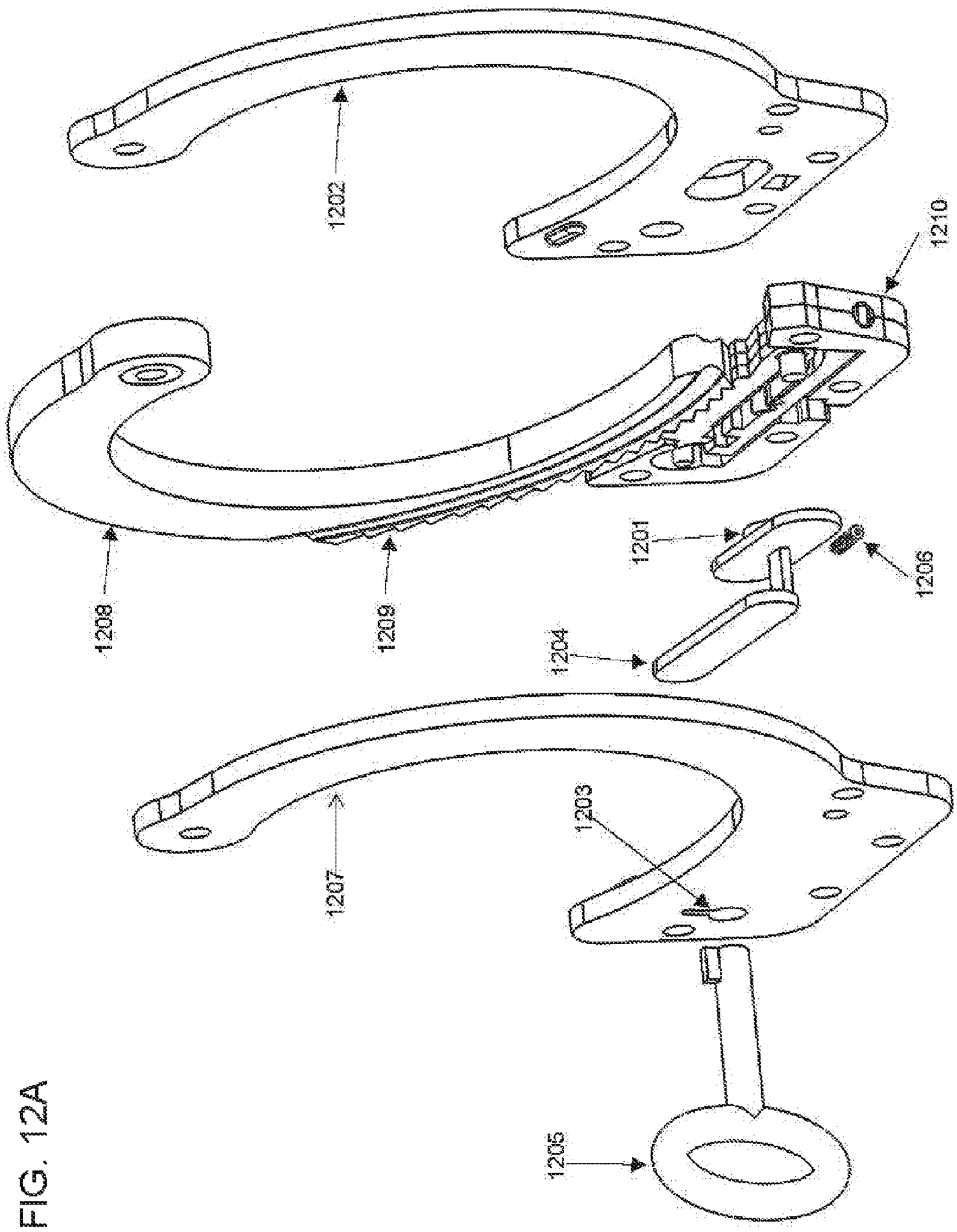



FIG. 12A

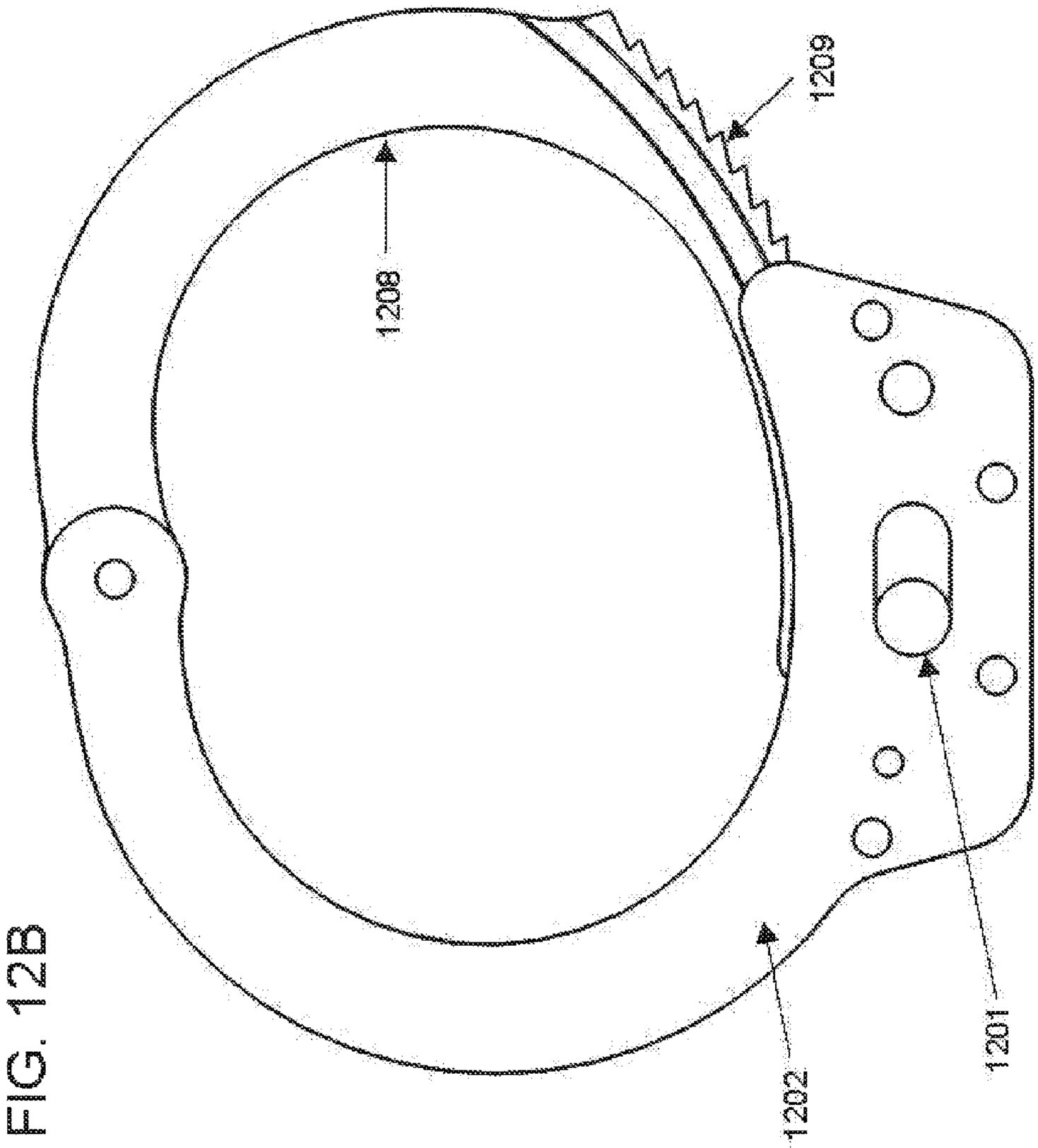



FIG. 12B

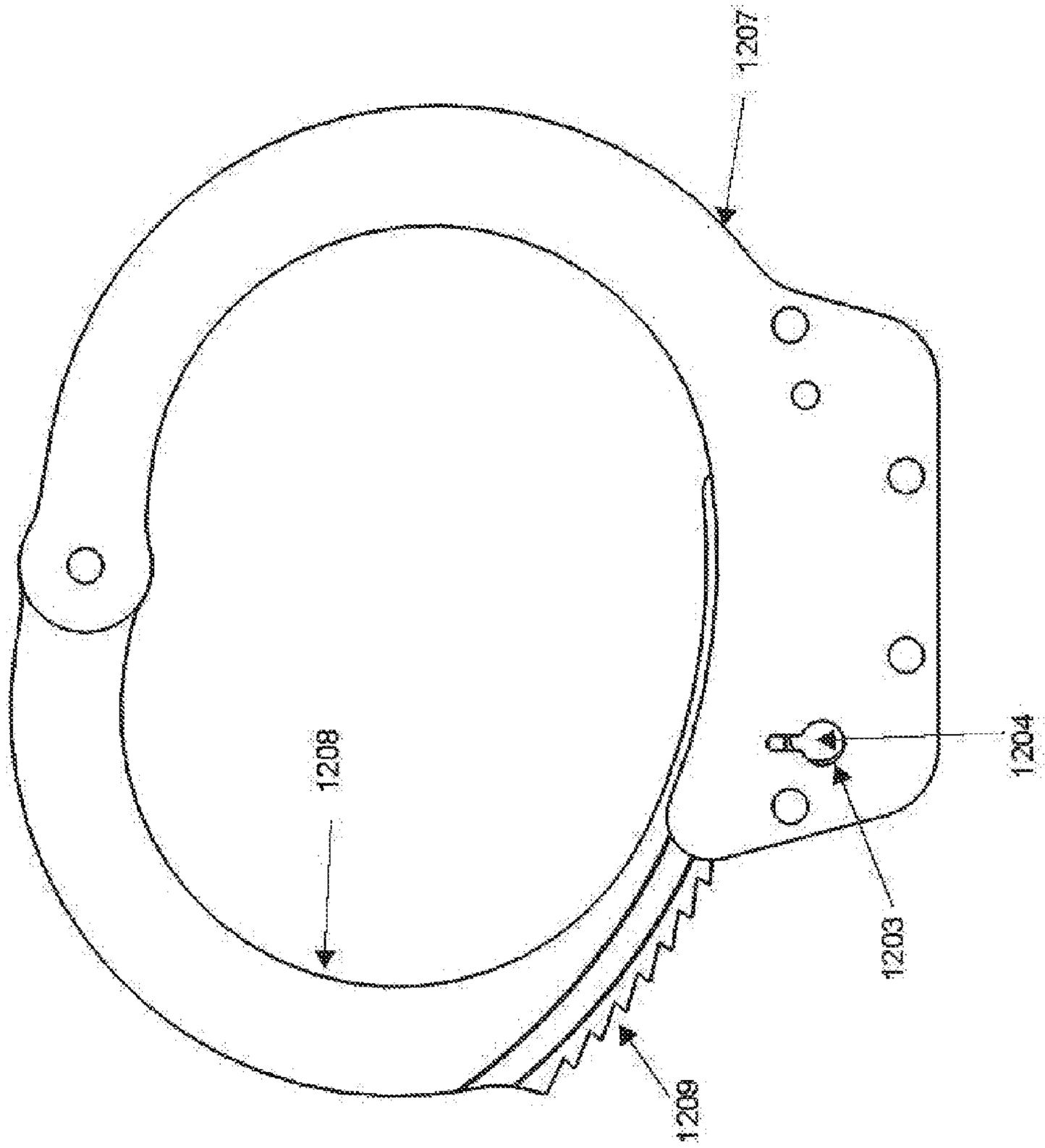



FIG. 12C

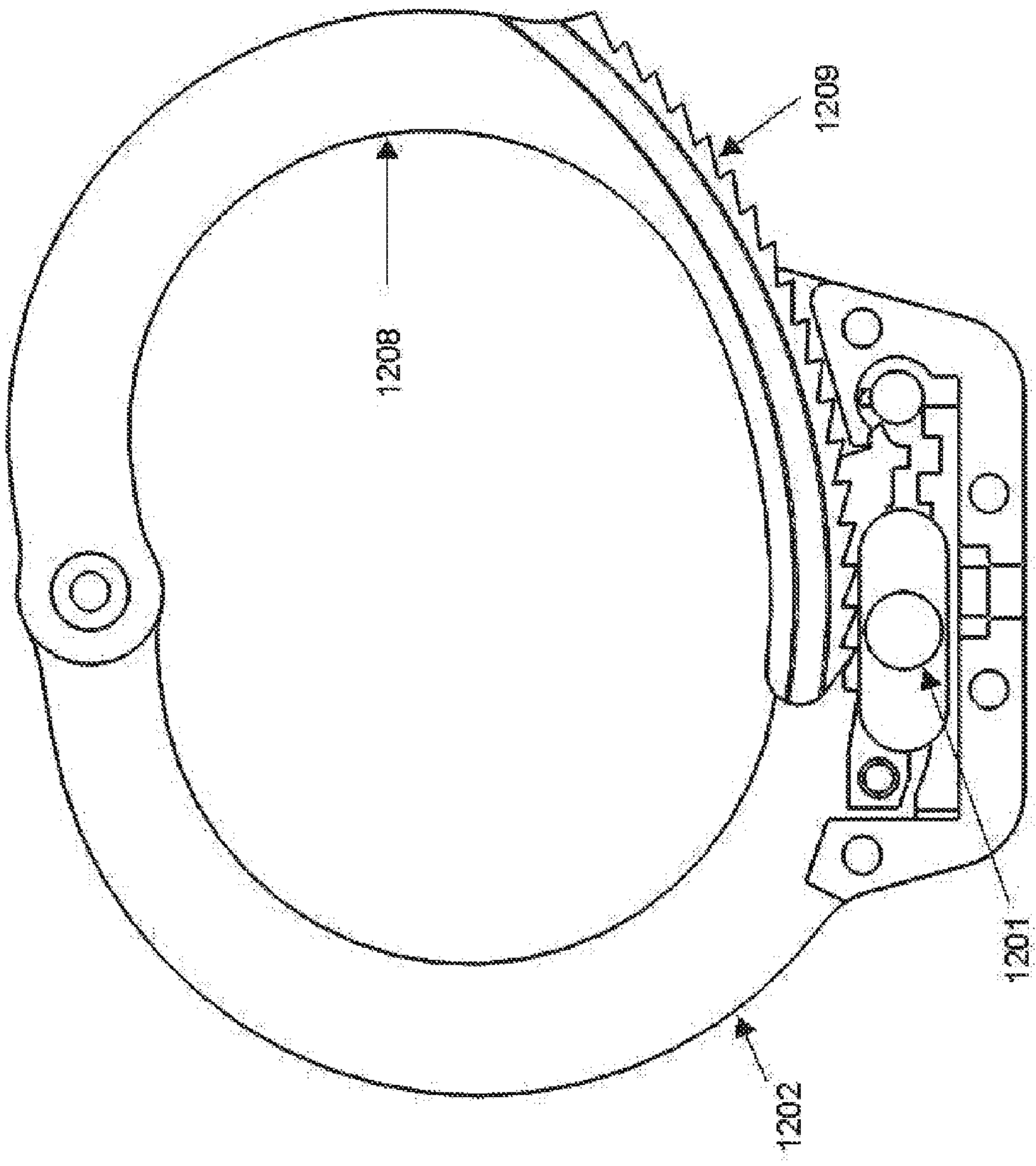



FIG. 12D

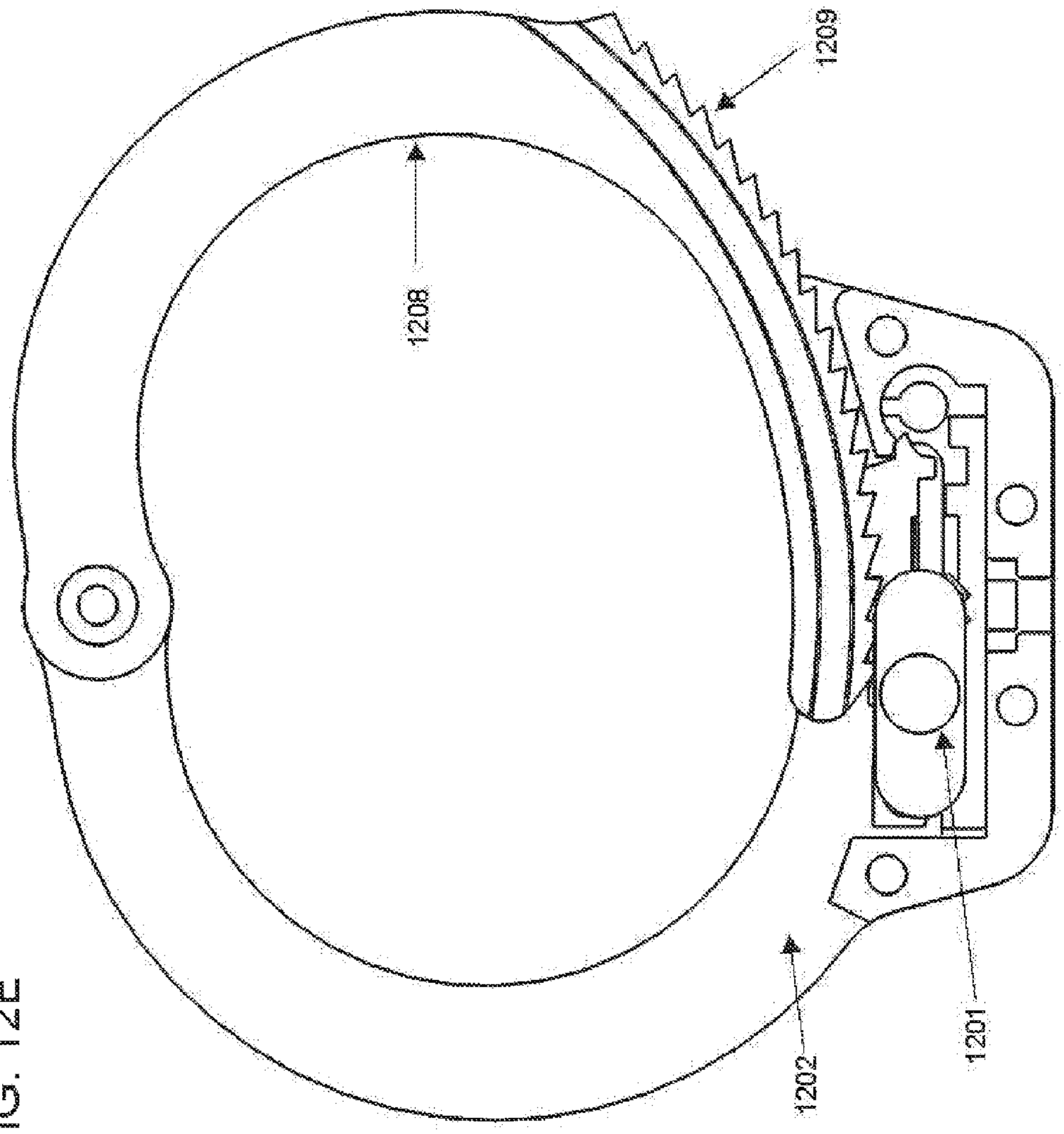



FIG. 12E

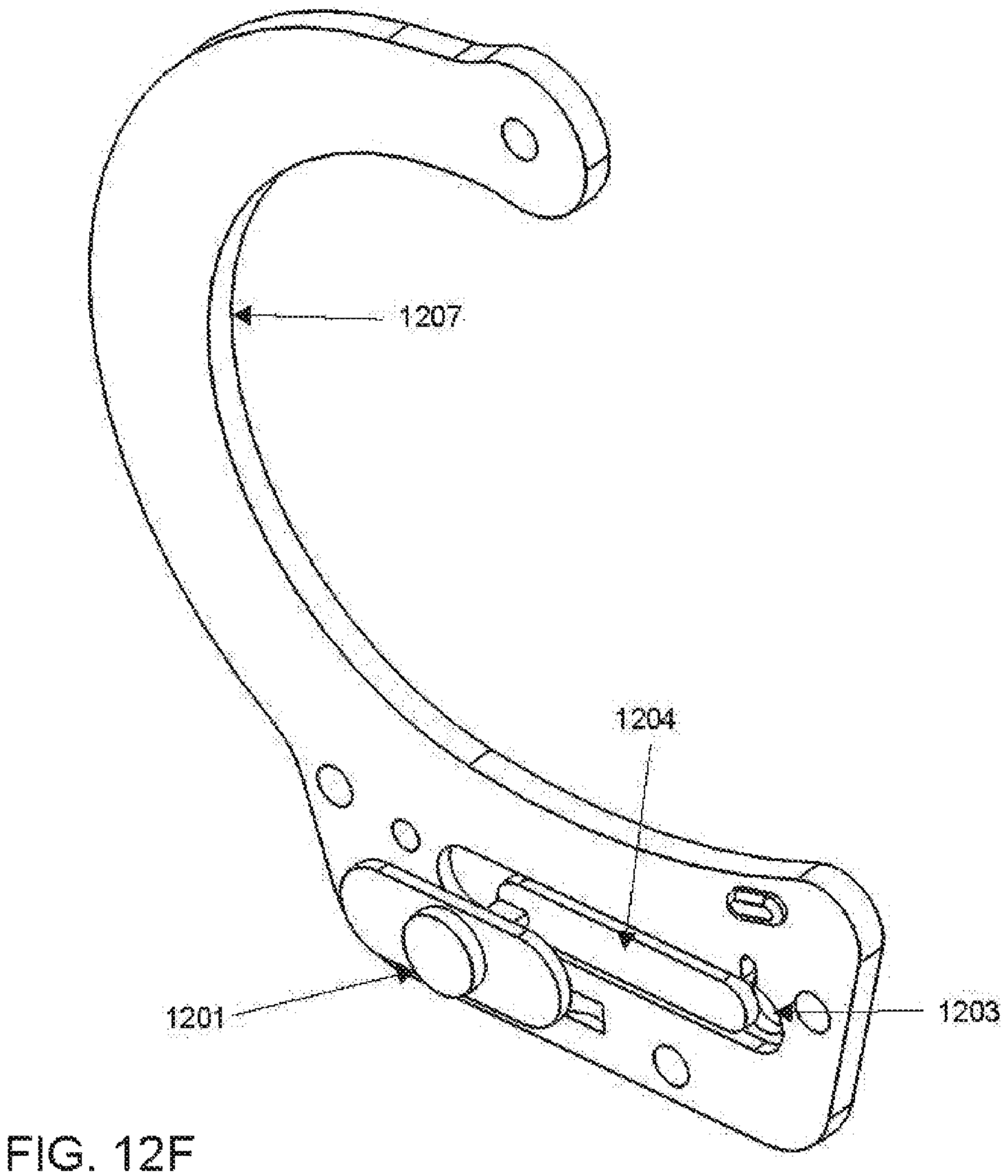



FIG. 12F

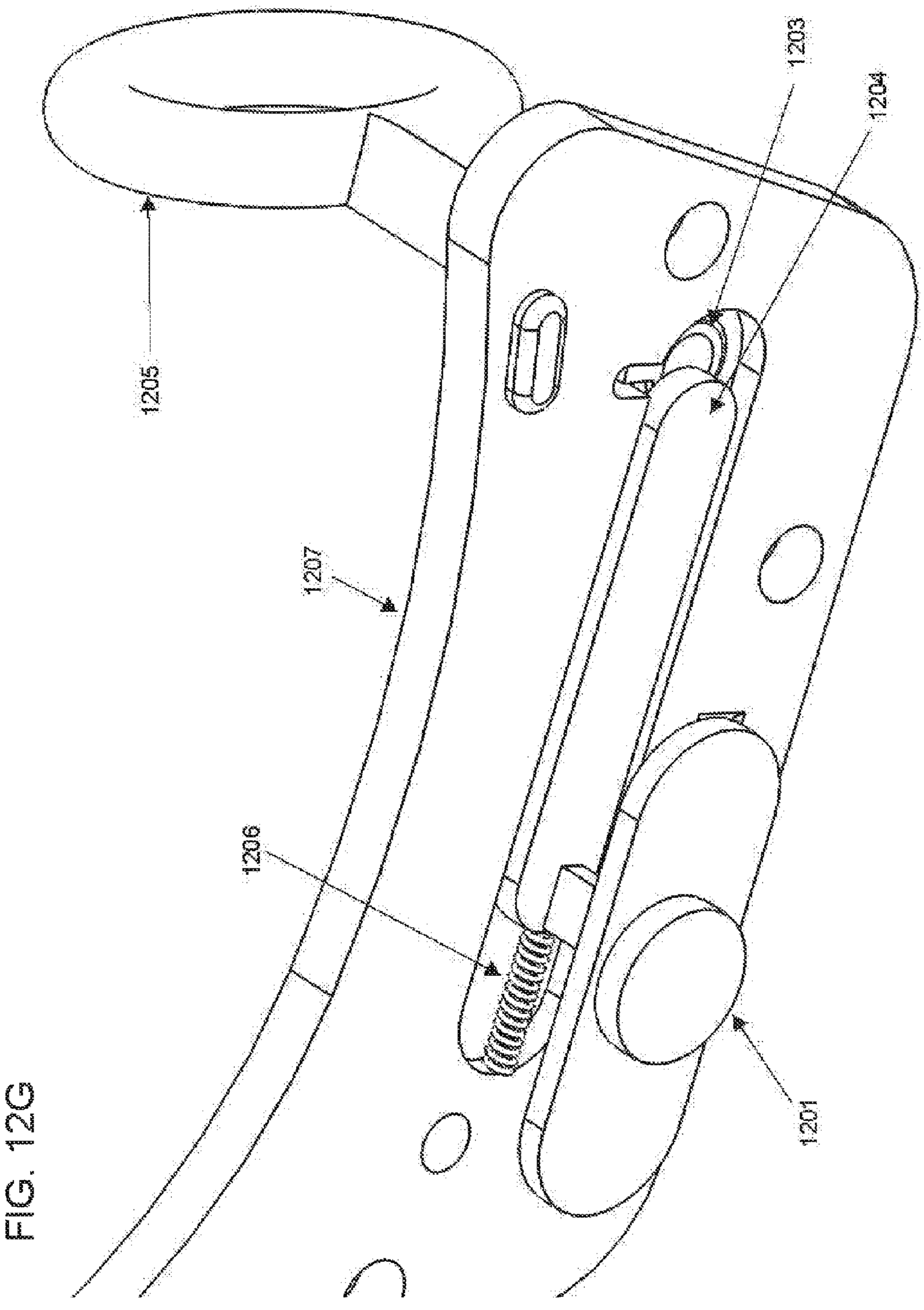



FIG. 12G

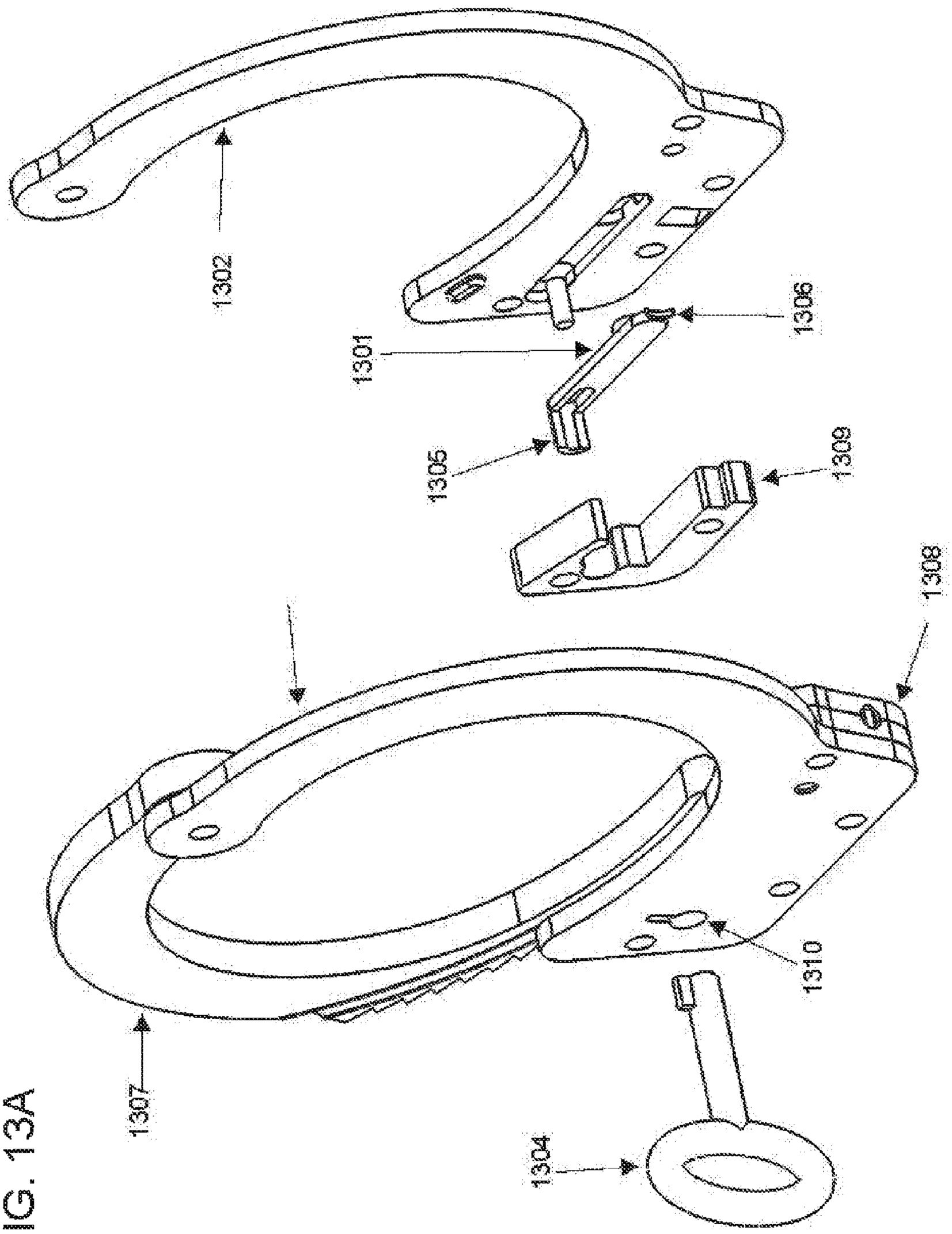



FIG. 13A

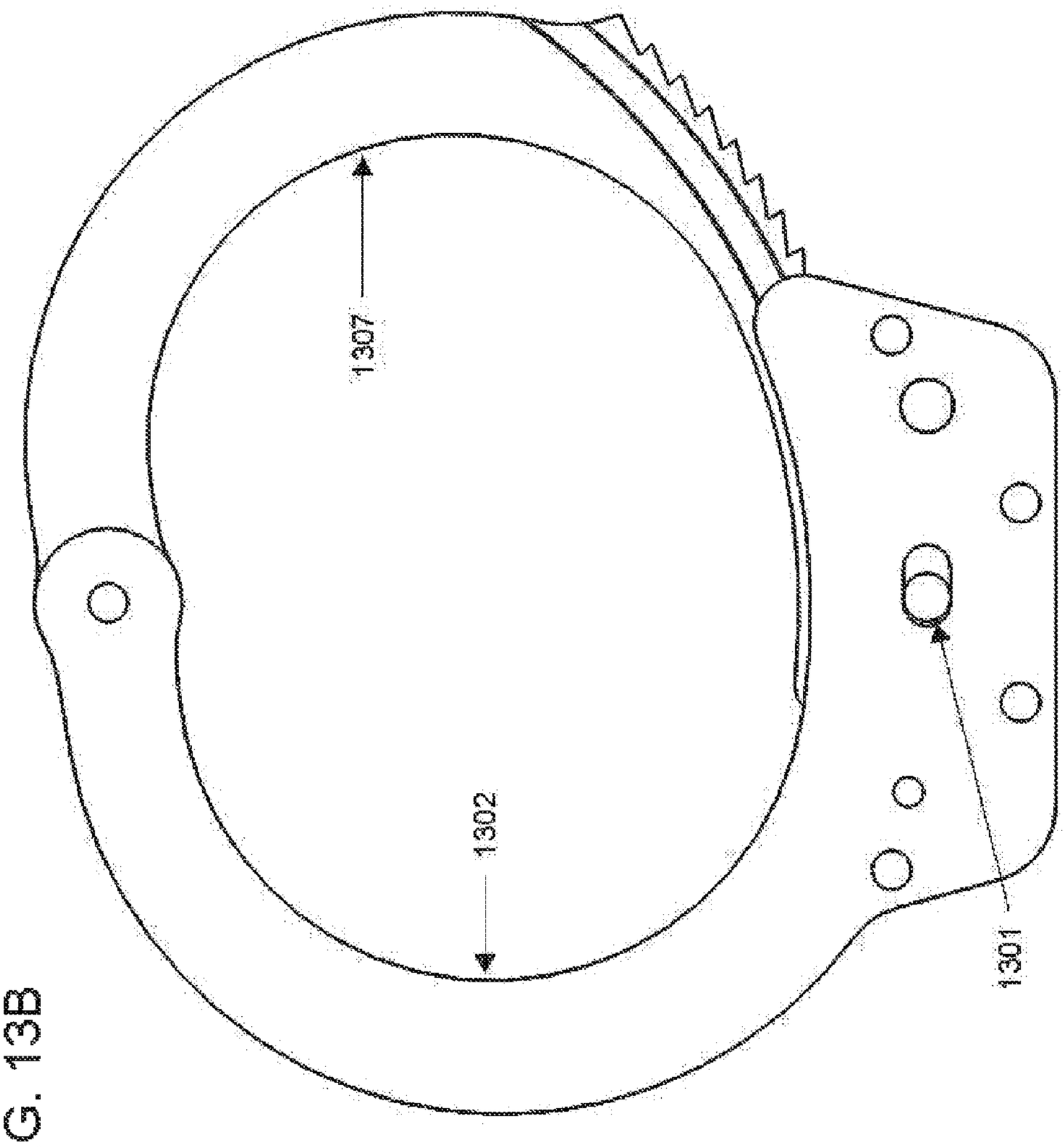
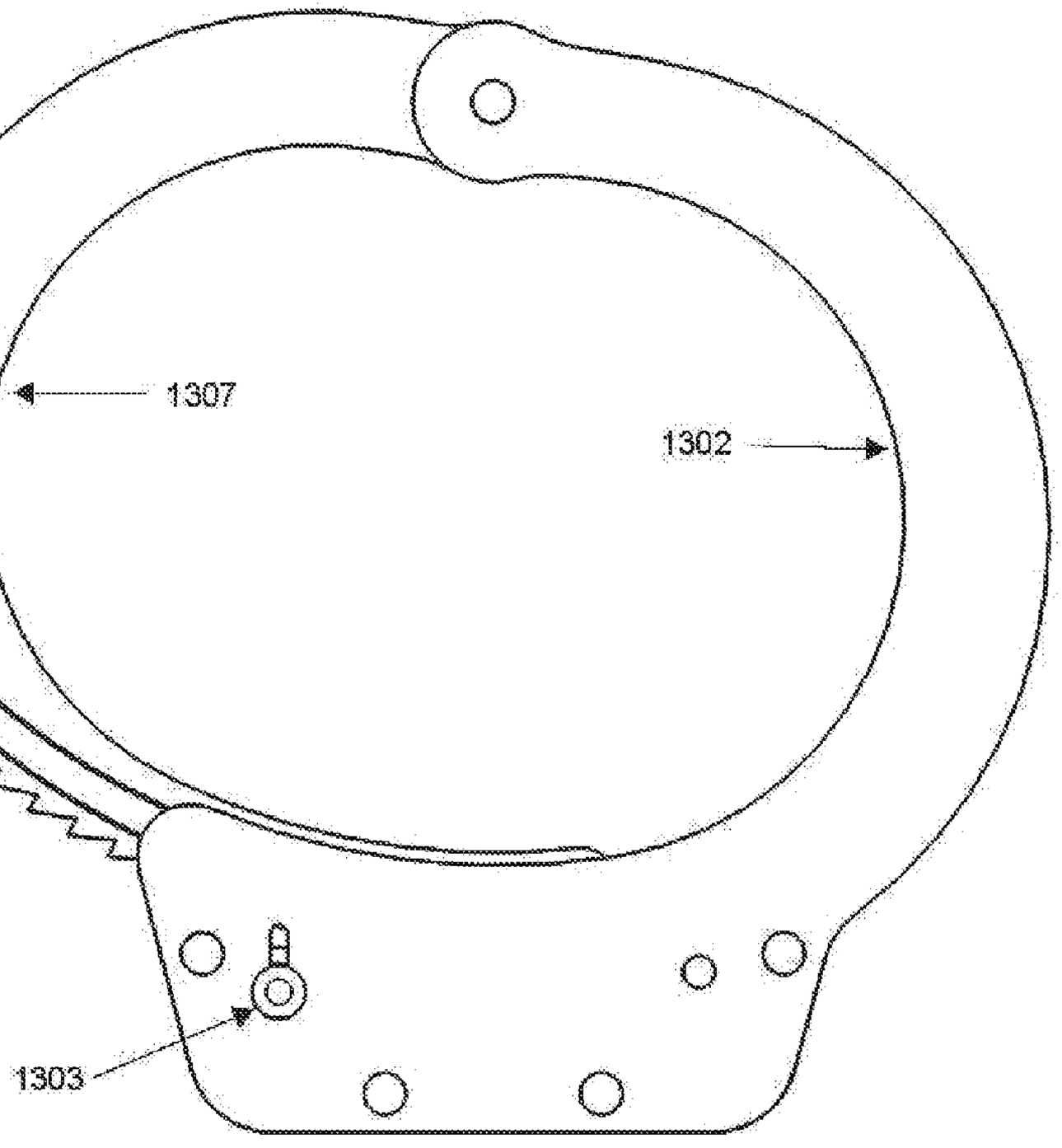



FIG. 13B

FIG. 13C



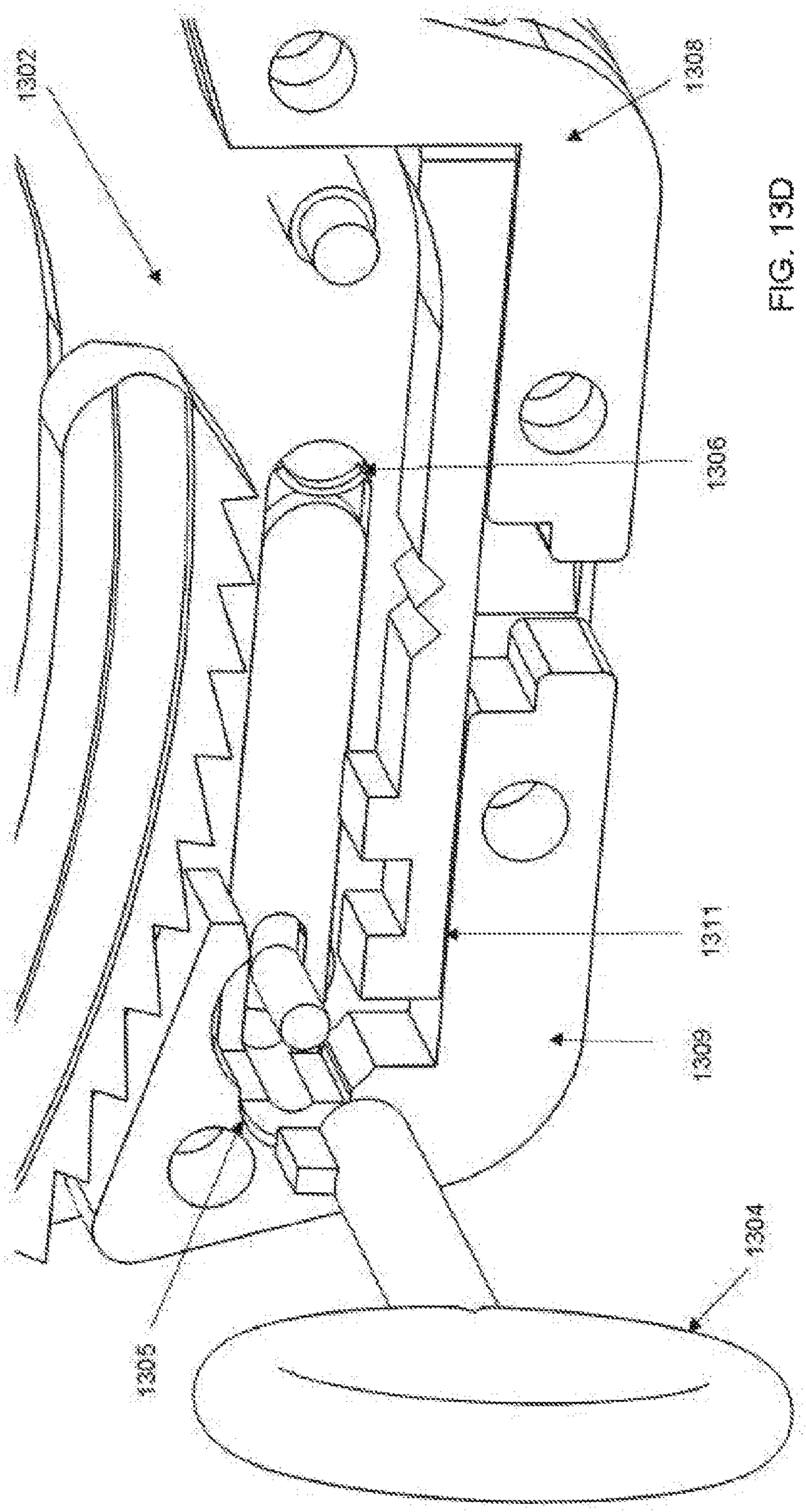



FIG. 13D

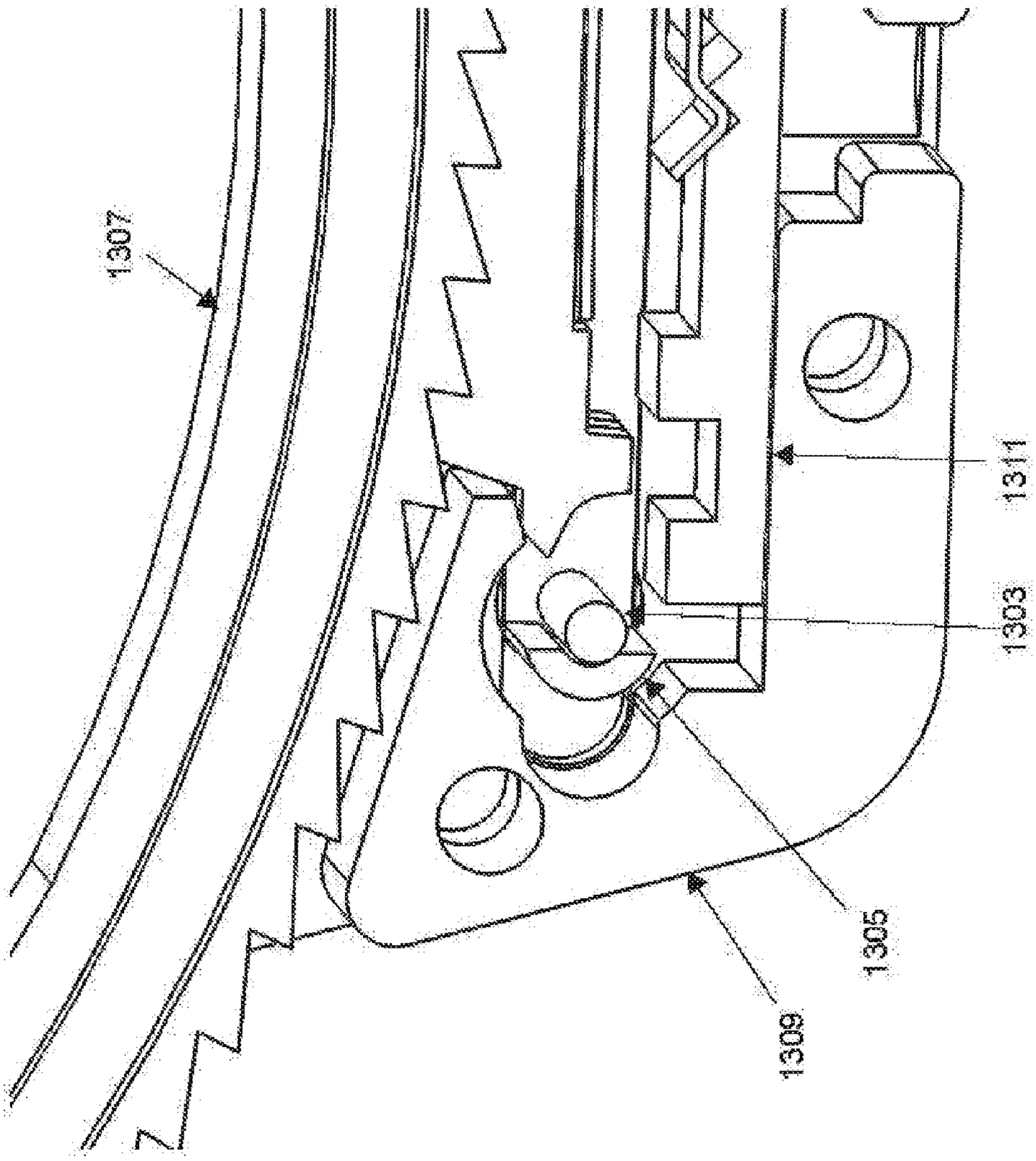



FIG. 13E

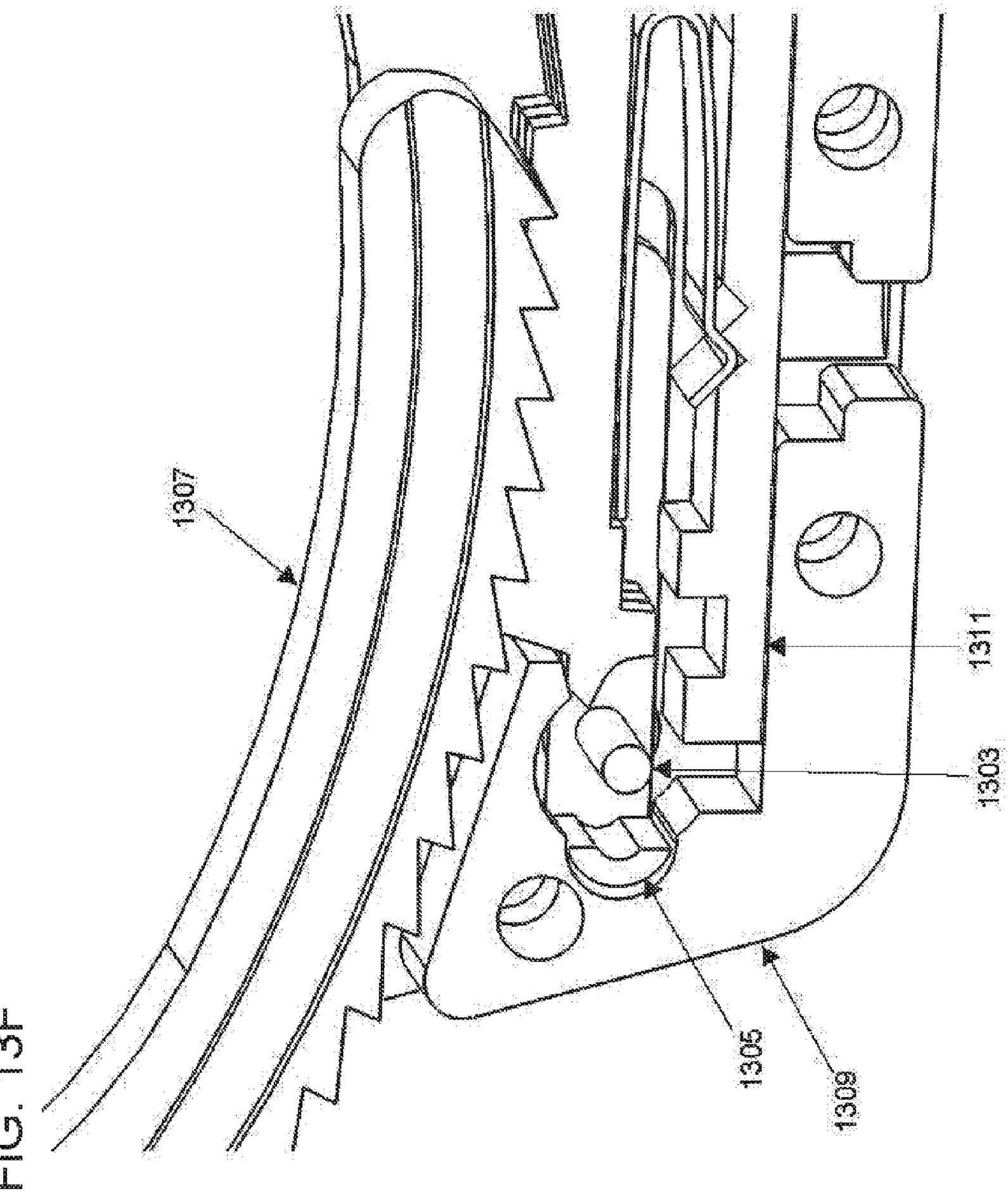



FIG. 13F

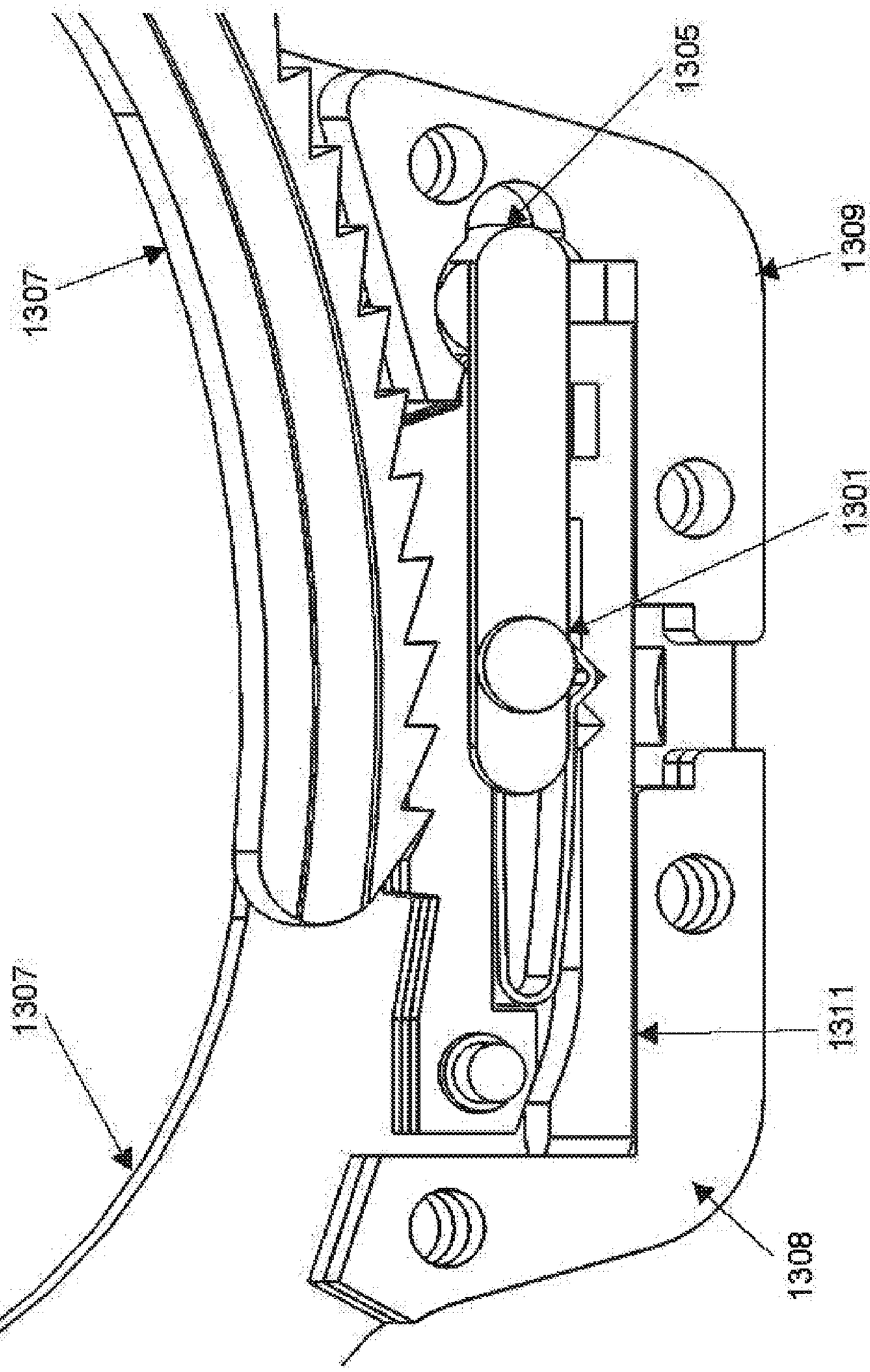



FIG. 13G

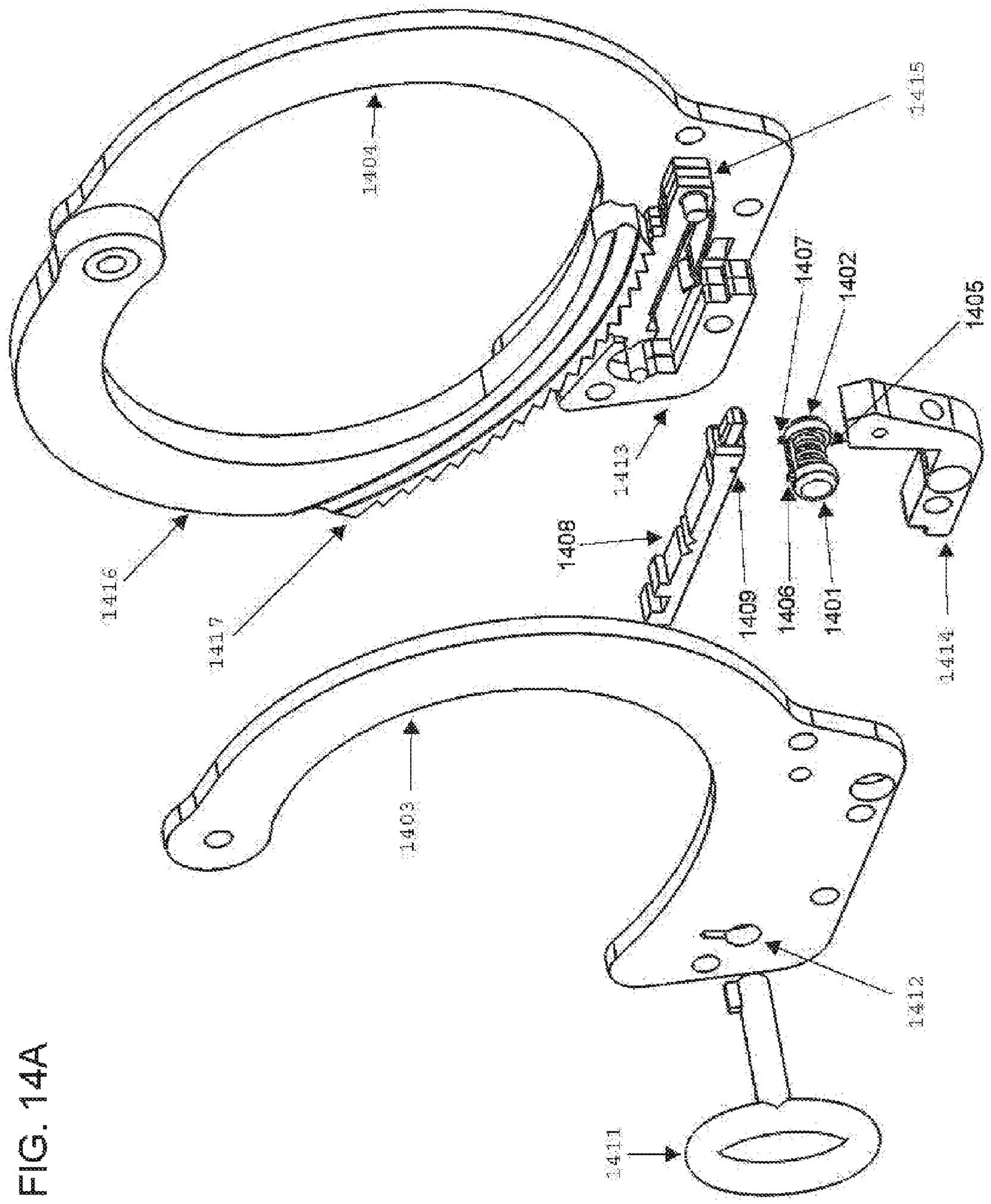

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FIG. 14A

FIG. 14B

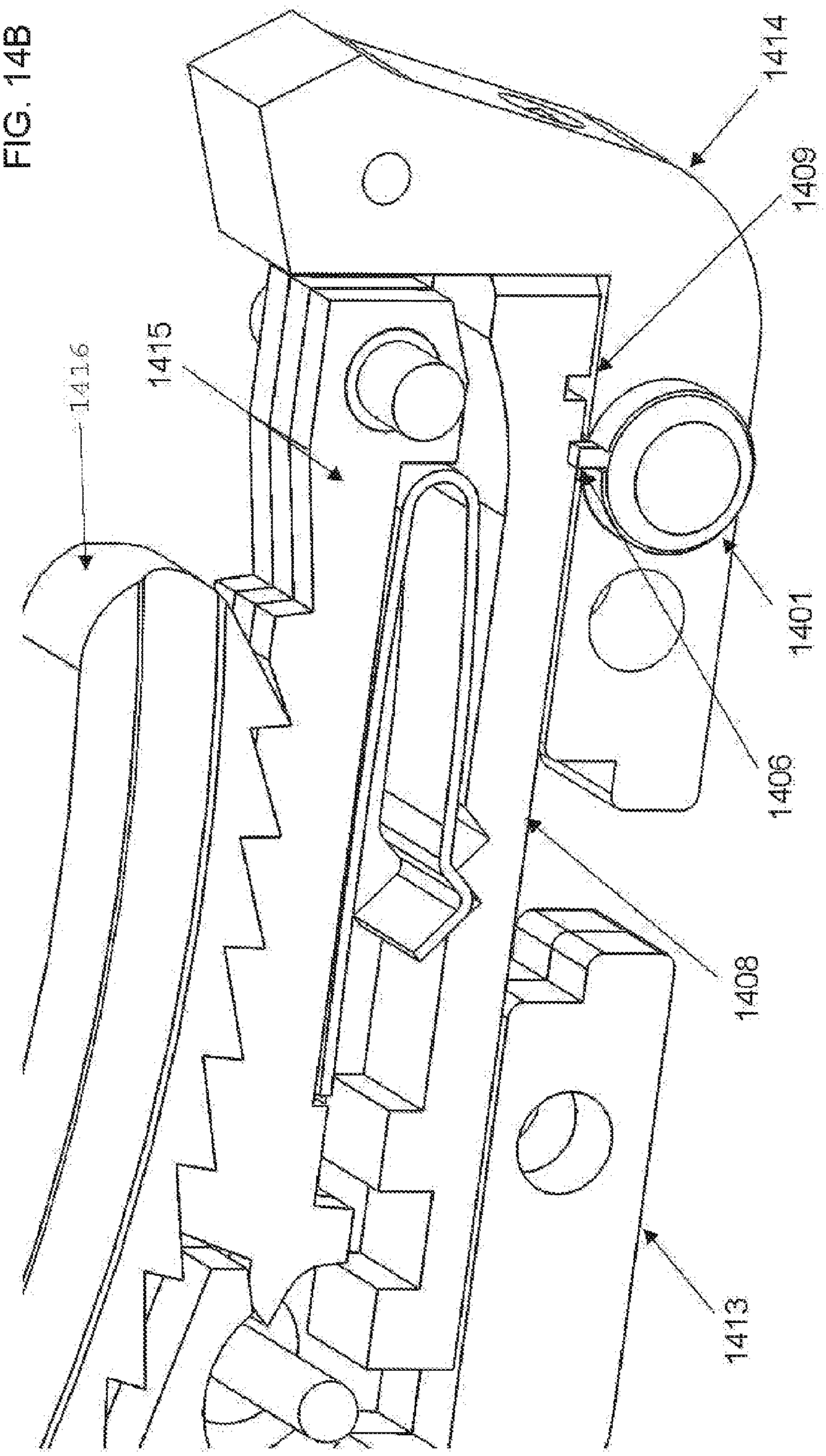


FIG. 14C

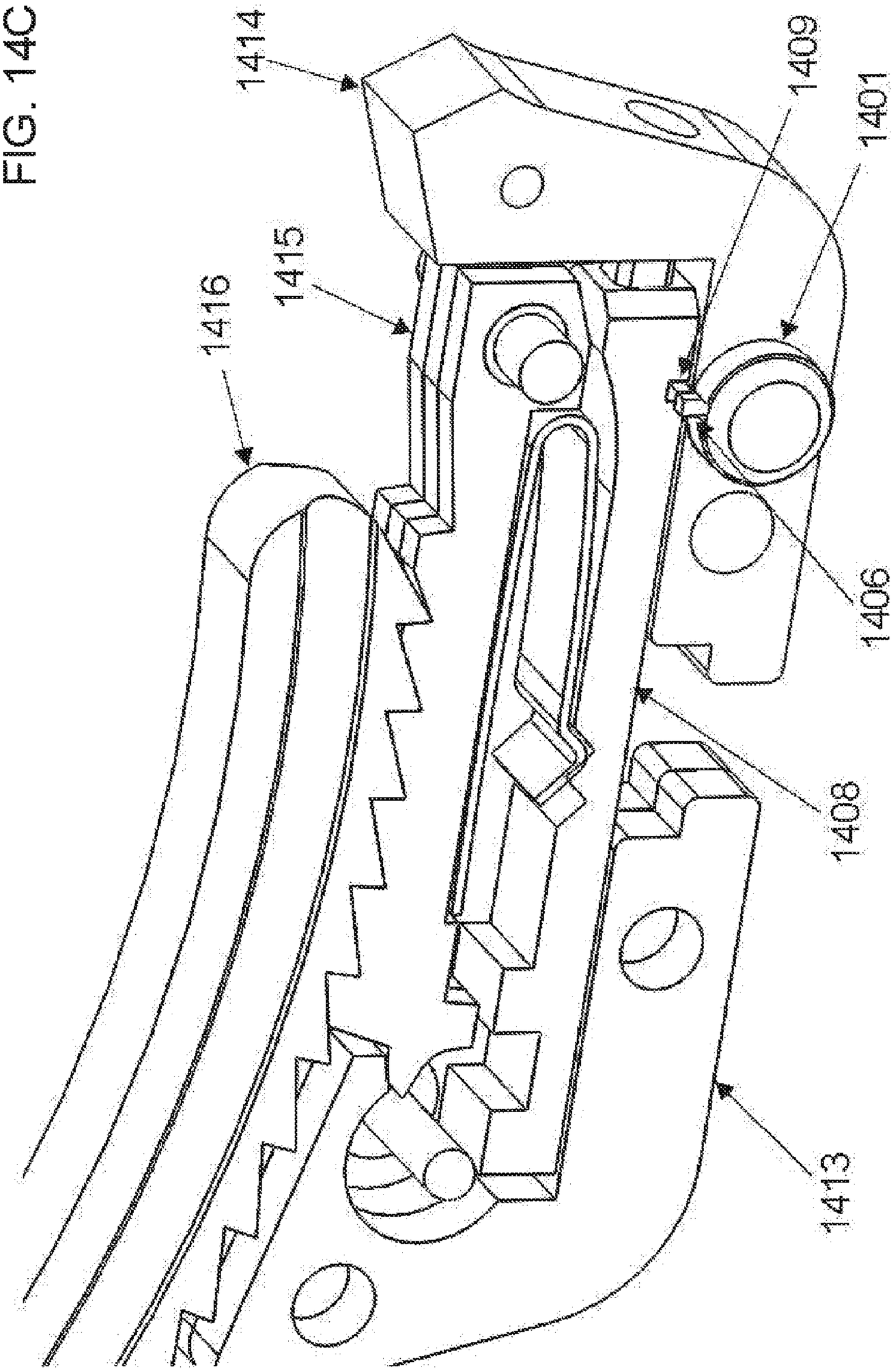


FIG. 14D

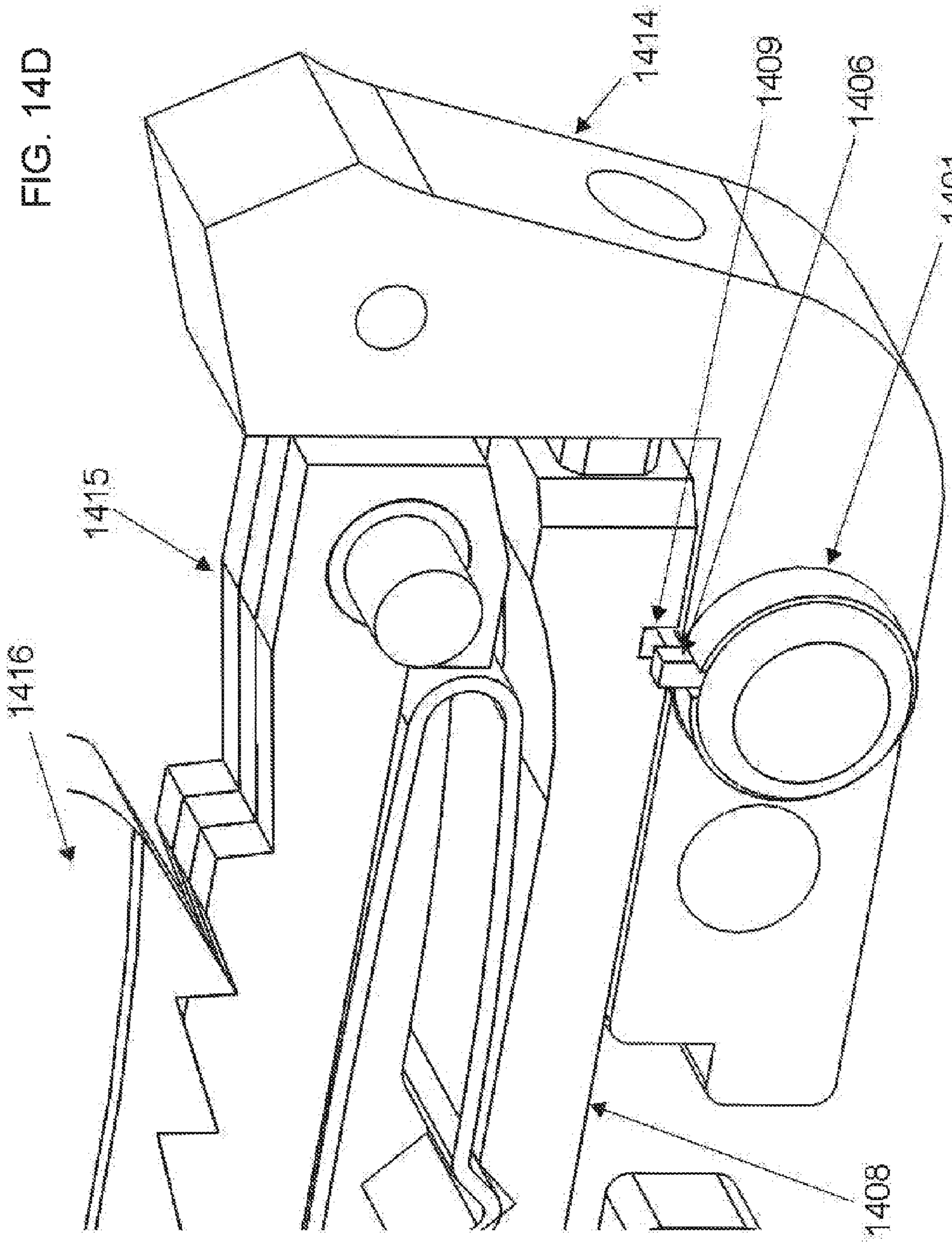
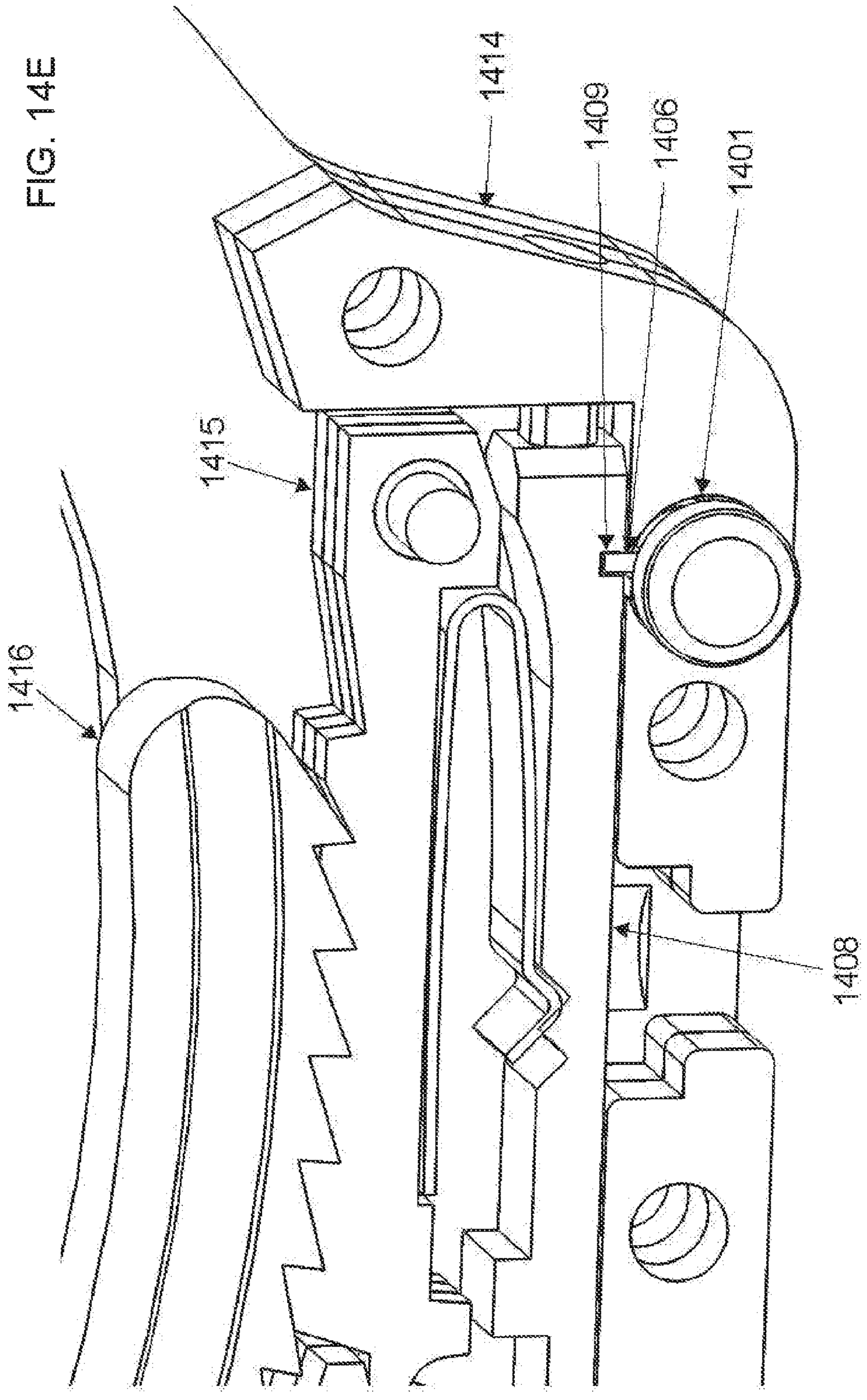


FIG. 14E



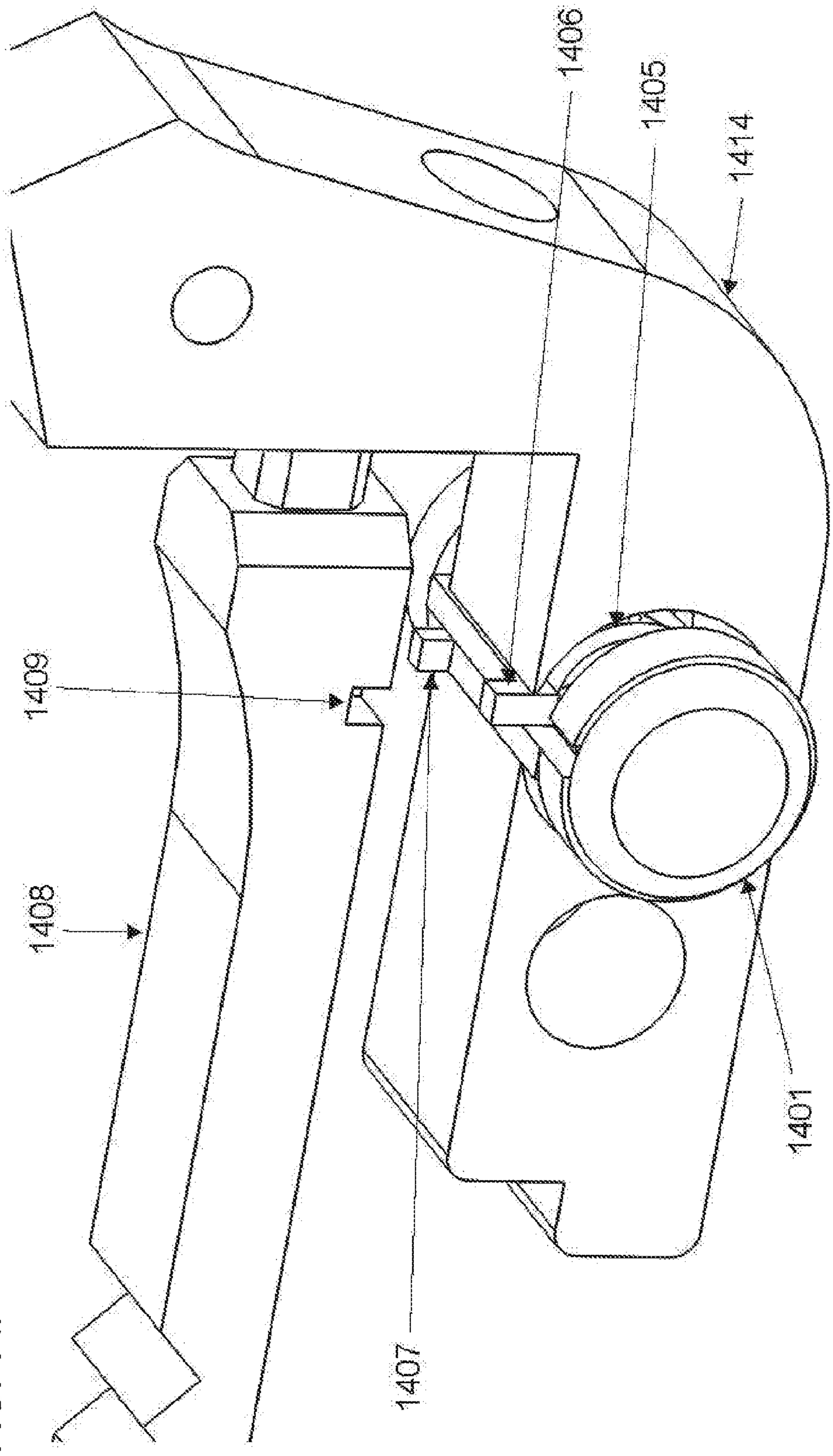



FIG. 14F

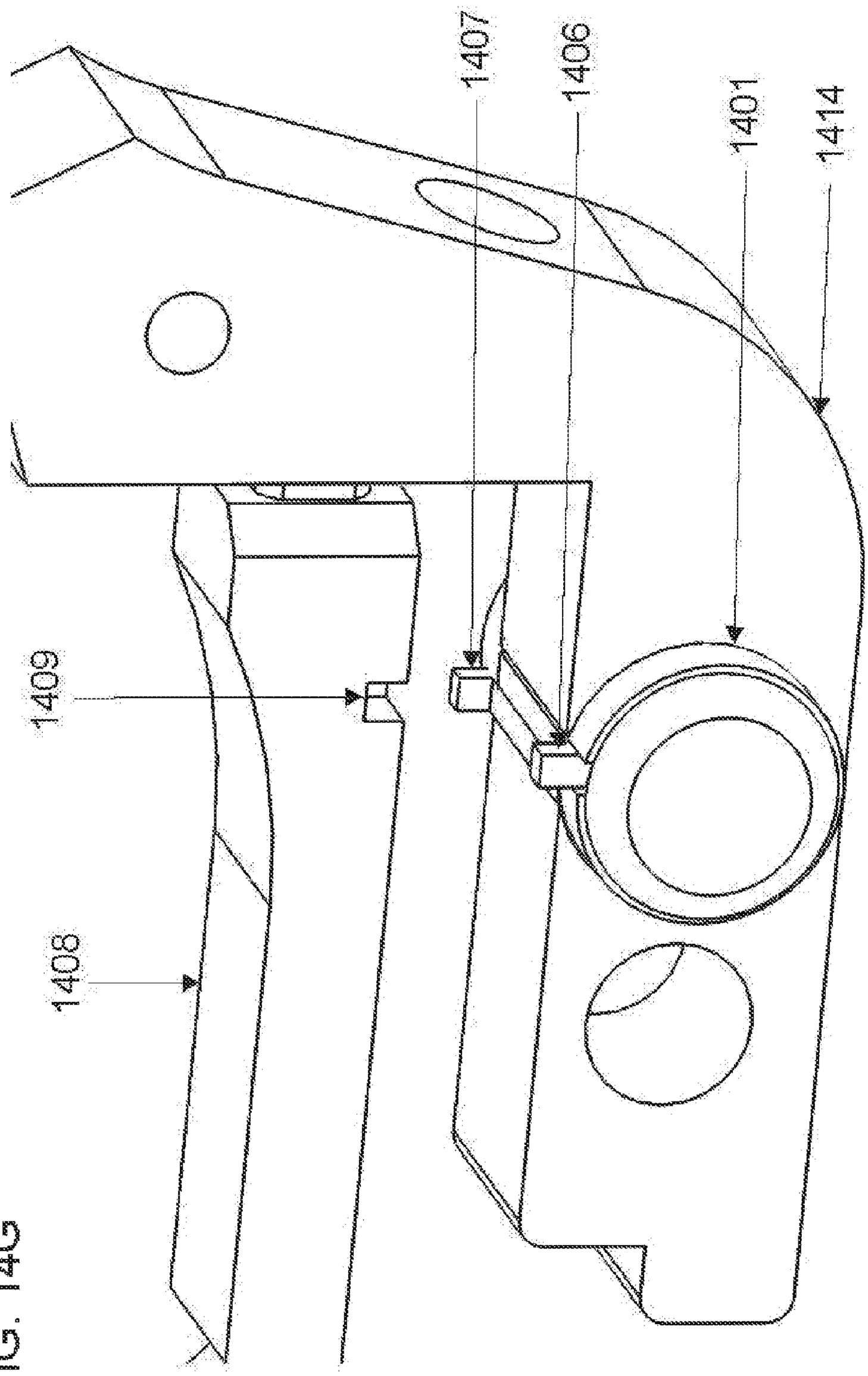



FIG. 14G

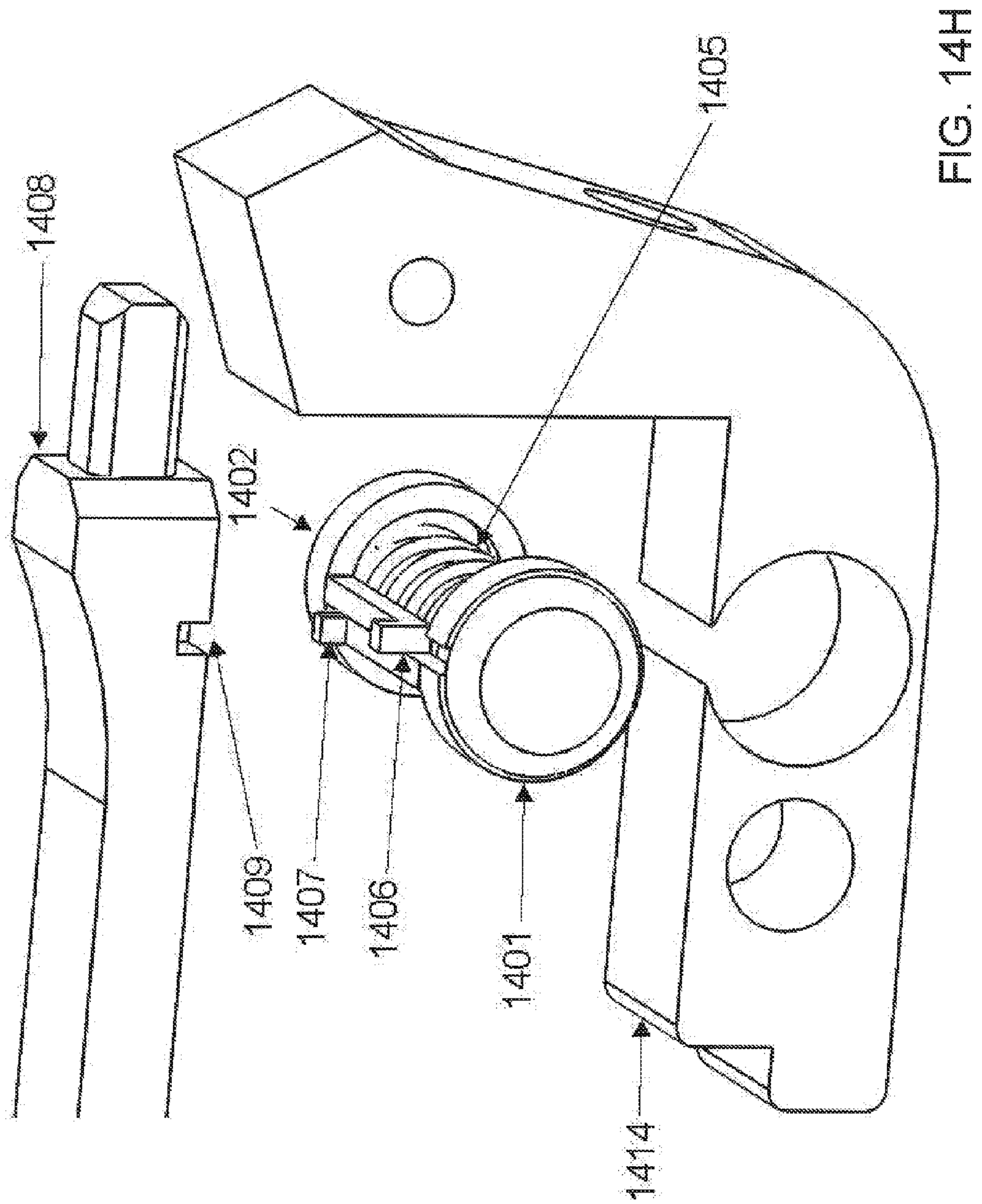



FIG. 14H

# HANDCUFF APPARATUS

## BACKGROUND

I. Field

The present disclosure relates generally to the field of personal restraint and securing of individuals, and more specifically to handcuffs used in various scenarios, such as law enforcement, military, corrections or private security, wherein enhanced features make removing the handcuffs more difficult for the restrained individual.

II. Background

Handcuffs have been used for centuries to restrain individuals in various scenarios, including but not limited to prison or correctional facility situations. Use and construction of handcuffs and similar restraints are well known, and handcuffs are generally accepted as an effective restraint system for use by law enforcement, military personnel, security officers and various other entities worldwide. Handcuffs are a standard issued item of police equipment utilized by every major law enforcement agency in the world, and handcuffs and/or related restraints are currently in use by police officers, corrections officers, private security officers, military personnel, and so forth. The same may be said for other restraining devices, including but not limited to handcuffs, leg chains, waist chains, finger cuffs, and any manner of mechanisms used to restrain a person's wrists, hands, arms, ankles, legs, feet, or any or other body part. As used herein, all these restraining devices will be generally referred to as "handcuffs" and the teachings herein may apply to other restraining devices while illustrated for use in, for example, restraining an individual by his or her wrists.

Handcuffs have for decades employed a standard ratchet teeth type locking system wherein a standard universal handcuff key is needed to unlock them. The basic design of handcuffs has been virtually unchanged for more than a century. Handcuffs are a critical piece of law enforcement equipment and very few viable alternatives to standard handcuffs exist. Although many manufacturers have attempted to create a more secure handcuff, these have largely been commercially unsuccessful and thus the same traditional handcuff style used decades ago is still in use today.

The standard handcuff in use by law enforcement today utilizes a bracelet type design placed around a wrist and secured via a ratchet which is then locked into place. The teeth of the ratchet engage the teeth of the spring-loaded pawl located inside the bracelet and when the pawl is forced against the ratchet, the two sets of teeth are locked together. To release the handcuffs, the pawl must be disengaged from the ratchet teeth, which is accomplished with the use of a universal handcuff key. The handcuff key is rotated to disengage the primary lock. The design of the ratchet teeth and pawl allows for free movement of a piece called a strand when tightening the handcuffs, but prevents the single strand from loosening unless the pawl is depressed so that it may no longer engage the ratchet teeth.

Each wrist of the wearer is secured with an individual handcuff connected to another handcuff via a small chain, hinge, solid locking component, or other method. This assembly is commonly referred to as a set of handcuffs, a pair of handcuffs, "handcuffs" or any other derivative phrase indicating two or more handcuff portions secured together to form a unit capable of securing two or more appendages of a wearer.

A universal handcuff key is used to manipulate a double lock bar mechanism, which moves laterally under the pawl.



The double lock bar can be set to prevent the pawl from being depressed thereby locking the single strand into place. Handcuffs with double lock bars have a detent, which when engaged, stops the cuff from ratcheting tighter and prevents the wearer from over-tightening the cuffs. Tightening the handcuff ratchets could be intentional or may occur unintentionally when pressure is applied to the single strand ratchet. As a result, handcuffs may cause nerve damage or loss of circulation in a wearer's hands due to over-tightening. Additionally, some wearers may tighten the handcuffs in order to attempt an escape by utilizing lock picking tools or have an officer loosen the handcuffs where the wearer subsequently attempts to escape while the handcuffs are loosened. Double locking the handcuffs make picking handcuff locks more difficult.

These traditional and current handcuff designs are extremely susceptible to countermeasures and escape attempts such as lock picking. Lock picking is the practice of unlocking a lock by manipulating various components of the locking device without the use of the original key. For purposes of this document, the term "lock picking" will broadly be used to describe various countermeasures utilized in an attempt to defeat the security capabilities of handcuffs or related restraints.

Handcuffs may be opened in four general ways: utilizing a handcuff key or lock pick, slipping the hands out of the handcuffs when the hands are smaller than the ratchet openings, releasing the pawl with a shim, or breaking the handcuff chain commonly known as "handcuff breaking."

A significant issue with commercial handcuffs today is the ability to unlock the cuffs using a single commonly available universal handcuff key. The universal handcuff key is simple in its design and encompasses a shaft, a bow which is used to grip the key, a single bit which engages the pawl of the handcuffs to release the single strand and a peg used to engage the double locking mechanism. Due to the simple design of the key and corresponding locking mechanism inside the common handcuff, significant vulnerabilities exist in the design.

Many law enforcement officers utilize handcuffs designed for use with a universal handcuff key due to needs for operational and field expediency. Handcuffs are often placed on suspects and physical custody of the individual(s) is transferred to other law enforcement personnel. The need to have a common key is important to ensure efficiency when cuffing, uncuffing or transporting a prisoner whether it is in a patrol environment, the courts, a jail system, prisons or any other setting. Further, emergency situations can sometimes arise when releasing the individual is required for the individual's safety, and an unusual or remote key could potentially result in harm to the individual.

Due to this commonality of the universal handcuff key design, suspects and other non-law enforcement related personnel sometimes carry handcuff keys on their person in anticipation of defeating handcuff locking mechanisms. Variations of the universal handcuff key are often hidden and kept by criminals and inmates on their person with the intent to escape and/or assault someone. Handcuff keys have been known to be built into devices and/or attached to designs to be worn on a person's clothing or body wherein they are not readily recognized as a handcuff key. These surreptitious handcuff keys can then be quickly deployed and utilized to escape or attack an officer or other individual nearby.

Additionally, a simple pin or piece of metal (or similar object) can be utilized to pick the primary handcuff locking mechanism, or a shim can be forced between the single strand ratchet teeth and the pawl, thereby releasing the

handcuffs. Books and instructional videos are readily available demonstrating various ways to open handcuffs—even by the wearer. These methods for picking standard handcuffs can be learned and completed with the use of a single hand by individuals even while handcuffed with their hands behind their backs.

Lock breaking refers to a method whereby the handcuffs are twisted in such a manner as to cause undue torsion on the small chain connecting the two handcuff assemblies. Additional tension is then exerted with force by the wearer so that the chain breaks thereby freeing a suspect's hands. Such a vulnerability is also undesirable.

There is a need for enhanced security handcuffs which provides substantially greater security and an inability for them to be opened by the wearer. Security handcuffs should be simple to operate, should preferably have a generally similar form factor as current designs, and still utilize a universal handcuff key. Handcuffs should be extremely difficult, if not impossible, to open by the wearer of the handcuffs even if they are in possession of the handcuff key or other lock picking device. Handcuffs should nevertheless be capable of easily being unlocked by an officer, utilizing a universal handcuff key, while at the same time avoiding the design limitations and vulnerabilities associated with earlier designs.

## SUMMARY

According to one embodiment, there is provided a set of handcuffs comprising a handcuff strand comprising ratchet teeth, a universal handcuff key locking mechanism configured to receive a universal handcuff key to unlock the handcuffs, and locking means provided on one handcuff of the set of handcuffs requiring more than one hand to manipulate in addition to employing the universal handcuff key to release the ratchet teeth and unlock the set of handcuffs. Locking means may comprise a variety of arrangements, including but not limited to a multiple tab spring, a sliding mechanism, a design wherein the handcuff strand comprises a plurality of openings configured to receive teeth engageable by depressing a plurality of buttons, a chain tension lock bar, a multiple element spring and a multiple element key pawl, a double lock chain hinge, a two button arrangement comprising a spring positioned between two buttons, a double lock and spring-plunger arrangement, a hook component configured to engage a key pawl to keep the key pawl from moving, an opposing two button arrangement configured to lock and release a key pawl, a double lock with sliders on both sides of one handcuff, as well as numerous other embodiments of the design.

According to a further embodiment, there is provided a restraining arrangement comprising a releasable strand comprising ratchet teeth, the releasable strand configured to tighten and loosen about a wearer, a universal key locking mechanism configured to receive a universal key to unlock the restraining arrangement, and locking means provided in the restraining arrangement requiring more than one hand to manipulate in addition to employing the universal handcuff key to release the ratchet teeth and unlock the restraining device from the wearer.

According to a third embodiment of the present design, there is provided a set of handcuffs comprising a releasable handcuff strand comprising ratchet teeth, the releasable handcuff strand configured to tighten and loosen about a wearer, a universal key locking mechanism configured to receive a universal key to unlock the set of handcuffs, and locking means provided on a single handcuff of the set of handcuffs, the locking means requiring more than one hand to manipulate in addition to employing the universal key to release the ratchet teeth and releasable handcuff strand and unlock the restraining device from the wearer.

Various aspects and features of the disclosure are described in further detail below.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A shows an exploded view of the handcuffs of the first embodiment;

FIG. **1**B illustrates the triple tang spring;

FIG. **1**C shows button pawl disengaged while the key pawl remains engaged with the ratchet teeth;

FIG. **1**D provides a second view showing the button pawl disengaged while the key pawl remains engaged with the ratchet teeth;

FIG. **1**E illustrates all three pawls retracted and disengaged from the single strand ratchet teeth;

FIG. **2**A illustrates an exploded view of a second embodiment;

FIG. **2**B shows the key pawl and the side pawls engaged with the single strand ratchet according to the second embodiment;

FIG. **2**C illustrates the key pawl and the side pawls disengaged from the single strand ratchet;

FIG. **2**D shows the exterior of the handcuff according to the second embodiment;

FIG. **3**A shows an exploded view of a third embodiment.

FIG. **3**B is an outside view of a handcuff according to the third embodiment;

FIG. **3**C shows an interior view of a handcuff where a plate bocks the keyhole on the same side as the keyhole;

FIG. **3**D shows an exterior view of the handcuff where the button is retracted exposing the keyhole according to the third embodiment;

FIG. **3**E shows an interior of the handcuff where the button is retracted exposing the keyhole;

FIG. **4**A illustrates an exploded view of a fourth embodiment;

FIG. **4**B shows the buttons in a normal resting position with the extensions engaging a number of indentations;

FIG. **4**C is another view according to the fourth embodiment with extensions engaging the indentations;

FIG. **4**D shows the buttons being depressed and the extensions retracted from the indentations;

FIG. **4**E shows another view where the buttons are depressed and the extensions are retraced from the indentations;

FIG. **5**A illustrates an exploded view of a fifth embodiment;

FIG. **5**B depicts the interior handcuff with the chain tension lock bar pawl engaged with the ratchet teeth;

FIG. **5**C shows the chain tension lock bar pawl disengaged while the key pawls remain engaged with the ratchet teeth;

FIG. **6**A illustrates an exploded view of sixth embodiment;

FIG. **6**B depicts two handcuffs connected via the roller chain;

FIG. **6**C shows the swivel collar turned and the double lock bar in the unlocked position according to the sixth embodiment;

FIG. **6**D illustrates the flat areas of the swivel collar aligned with the double lock bar tabs according to the sixth embodiment;

FIG. **6**E shows the tabs of the double lock bar engaged with the flat areas of the collar swivel according to the sixth embodiment;

FIG. **6**F shows a close up of the double lock bar and swivel collar assembly according to the sixth embodiment, wherein the flat areas of the swivel collar are aligned with the double lock bar tabs but have not been engaged.

FIG. **6**G shows a close up of the double lock bar and swivel collar assembly according to the sixth embodiment, wherein the flat areas of the swivel collar are aligned with the double lock bar tabs and are engaged;

FIG. **6**H shows the double lock bar and tab spring according to the sixth embodiment in a pre stage double lock configuration, wherein the flat areas of the swivel collar are not aligned and therefore the tab spring cannot fully seat into the "V" notch;

FIG. **6**I shows the interior of the handcuff according to the sixth embodiment while in pre stage double lock mode where the flat areas are not aligned;

FIG. **6**J shows the interior of the handcuff according to the sixth embodiment while in pre stage double lock mode where the flat areas are aligned;

FIG. **6**K shows the interior of the handcuff according to the sixth embodiment in double lock mode where the flat areas are aligned and engaged by the double lock bar tabs;

FIG. **7**A illustrates and exploded view of a seventh embodiment;

FIG. **7**B shows a close up according to the seventh embodiment of the double strands with the buttons and springs inserted whereby they are obstructing the ability of a handcuff key to turn;

FIG. **7**C shows the buttons according to the seventh embodiment not being depressed and the blocking tabs obstructing the ability for a handcuff key from turning;

FIG. **7**D shows the buttons, spring and blocking tabs obstructing the bit from a handcuff key according to the seventh embodiment;

FIG. **7**E shows the buttons depressed and the blocking tabs moved so they do not impede the movement of a handcuff key according to the seventh embodiment;

FIG. **7**F shows a close up of the buttons being depressed and the blocking tabs moved so they do not impede the movement of a handcuff key according to the seventh embodiment;

FIG. **8**A illustrates and exploded view of an eighth embodiment;

FIG. **8**B shows the interior of the handcuffs according to the eighth embodiment where the double lock mechanism is activated and the two-piece plunger is obstructing the ability for the double lock bar to move;

FIG. **8**C shows a close up of the plungers elevated into the keyhole area and obstructing the ability for the double lock bar to move according to the eighth embodiment;

FIG. **8**D shows a key inserted into the keyhole thereby depressing the plungers downward and aligning the ability for the double lock bar to move according to the eighth embodiment;

FIG. **8**E shows a close view of a key inserted into the keyhole, depressing the plungers downward and aligning the ability for the double lock bar to move according to the eighth embodiment;

FIG. **8**F shows a key inserted, turned and having pushed the double lock bar into an unlocked position according to the eighth embodiment;

FIG. **8**G shows another view of a key inserted, turned and having pushed the double lock bar into an unlocked position according to the eighth embodiment;

FIG. **8**H depicts an exploded view of the mid plate, double lock bar, plungers and spring according to the eighth embodiment;

FIG. **9**A illustrates and exploded view of a ninth embodiment;

FIG. **9**B depicts a key inserted in the keyhole and turned to engage a hook shaped component with the double lock bar engaged;

FIG. **9**C shows a close up of a key inserted in a keyhole and touching a hook shaped component hooked into a notch underneath the double lock bar according to the ninth embodiment;

FIG. **9**D shows a key inserted into the keyhole and turned to engage and depress a hook shaped component thereby allowing the key to continue to turn and unlock the double lock bar;

FIG. **10**A illustrates an exploded view of a tenth embodiment;

FIG. **10**B shows a close up of the buttons not being depressed and engaging notches in the double lock bar;

FIG. **10**C shows the buttons and how they interface with the double lock bar when not depressed according to the tenth embodiment;

FIG. **10**D shows the buttons according to the tenth embodiment depressed and disengaged from the notches in the double lock bar;

FIG. **10**E shows a close up of the buttons being depressed and disengaged from the notches in the double lock bar;

FIG. **10**F shows another view of the double lock bar and the buttons engaging with the notches, and the position of the springs relative to the buttons;

FIG. **11**A illustrates an exploded view of an eleventh embodiment;

FIG. **11**B shows the handcuff according to the eleventh embodiment where the double lock function is not engaged and the button is not interfaced with the notches in the double lock bar;

FIG. **11**C shows the inside of a double strand plate with the button and spring installed, where the button is not in double lock mode and the spring is compressed;

FIG. **11**D shows the handcuff according to the eleventh embodiment in double lock mode and the button interfaced with the notches in the double lock bar;

FIG. **11**E shows a close up of the double lock bar in the double locked position with the buttons interfaced with the double locked notches according to the eleventh embodiment;

FIG. **11**F shows the inside of a double strand plate with the button and spring installed where the button is in double lock mode and the spring is not compressed;

FIG. **12**A illustrates an exploded view of a twelfth embodiment;

FIG. **12**B shows the exterior of the handcuff according to the twelfth embodiment with a sliding button;

FIG. **12**C shows the exterior of the handcuff according to the twelfth embodiment with the keyhole;

FIG. **12**D shows the button in rest mode whereby the sliding cover obstructs the keyhole;

FIG. **12**E shows the button retracted whereby the sliding cover no longer obstructs the keyhole;

FIG. **12**F depicts the button mechanism and its interface with the double strand according to the twelfth embodiment;

FIG. **12**G shows the button mechanism with a spring according to the twelfth embodiment;

FIG. **13**A illustrates an exploded view of a thirteenth embodiment;

FIG. **13**B shows an exterior view of the button according to the thirteenth embodiment;

FIG. **13**C shows an exterior view of the keyhole according to the thirteenth embodiment;

FIG. **13**D shows the block moved so that a key may be inserted into the keyhole according to the thirteenth embodiment;

FIG. **13**E shows the button not engaged and the block obstructing the keyhole;

FIG. **13**F shows the button engaged and the block moved to no longer obstruct the keyhole;

FIG. **13**G shows the button not engaged and the block obstructing the keyhole;

FIG. **14**A illustrates an exploded view of a fourteenth embodiment;

FIG. **14**B shows the buttons according to the fourteenth embodiment with L shaped protrusions not engaged with the double lock bar;

FIG. **14**C shows the L shaped protrusions according to the fourteenth embodiment aligned with the notches in the double lock bar;

FIG. **14**D shows a close up of the L shaped protrusions aligned with the notches in the double lock bar;

FIG. **14**E shows a close up of the L shaped protrusions engaged with the notches in the double lock bar;

FIG. **14**F shows a close up of the two buttons, spring and L shaped protrusions fitting inside the mid plate according to the fourteenth embodiment with the L shaped protrusions engaged and the buttons not depressed;

FIG. **14**G shows a close up of the buttons according to the fourteenth embodiment being depressed so that the L shaped protrusions are not engaged with the double lock bar; and

FIG. **14**H shows the buttons, L shaped protrusions and spring assembly removed from the mid plate according to the fourteenth embodiment.

## DETAILED DESCRIPTION

The present design is related to enhanced security handcuffs requiring more than a single handed manipulation to open the handcuffs while using a standard handcuff key. In certain instances two or even three hands are required to open the cuffs, typically including one hand that turns a standard handcuff key and at least one other hand that releases mechanical components on the handcuffs. Multiple and simultaneous processes may be necessary to unlock the handcuffs according to the current design.

Millions of people are arrested or detained by law enforcement agencies and related entities each year and are subsequently handcuffed in order to restrain their limbs to prevent escape and/or attack. The use of handcuffs is accepted as an effective restraint system and they are used by every major law enforcement agency in the world. The standard handcuff ratcheting design utilizing a universal handcuff key has been virtually unchanged for more than 100 years and is still in use around the world today. Handcuffs are a critical piece of law enforcement equipment and very few effective alternatives to standard handcuffs exist. Most law enforcement agencies purchase and utilize handcuffs which are similar in design and capability regardless of the manufacturer.

Law enforcement officers are typically trained in one-handed techniques to place handcuffs on a suspect's wrists and a two-handed operation to uncuff a suspect. A standard key is used for almost all handcuffs and is universal in that the same key can be used to open almost all sets of handcuffs regardless of manufacturer. Because handcuff keys are universal and millions exist, they are readily accessible to suspects and inmates restrained by handcuffs, creating a tremendous liability to law enforcement officers. This condition is exemplified in the event those under arrest or being detained are able to obtain or conceal a handcuff key and uncuff themselves. This danger extends to members of the public, and in some cases, prison inmates. A simple design enhancement can make standard handcuffs substantially more effective in their capability to restrain a wearer even if the wearer is in possession of a handcuff key, and such an improvement is the subject of the present design.

The enhanced security handcuffs according to the present design address a need for a more secure, "unpickable" handcuff. Over the years, manufacturers have attempted to improve upon the traditional handcuff design, typically seeking to create a more advanced key and corresponding locking mechanism. This route, however, has been largely unsuccessful. Rather than creating an improved key design, the Enhanced Security Handcuff concept requires a dual operation to simultaneously manipulate an enhanced locking mechanism while turning the universal handcuff key. This unique combination of locking mechanisms and process(es) adds increased security to the traditional design.

Although many of the variations herein discuss the use of a standard universal handcuff key, it should be noted the designs incorporated herein also apply to handcuffs and restraints employing specialized, propriety and high security keys and locking mechanisms. Such specialized locking mechanisms may also be utilized to employ the designs described herein.

The present design allows for handcuffs to be applied to a suspect with the use of only one hand; however, one aspect of the present design requires simultaneously employing two hands with opposable digits to unlock or open the handcuffs, often while additionally manipulating a handcuff key. This requirement makes it extremely unlikely for an individual who is wearing the handcuffs to unlock and/or open them. This is largely because the wearer of the handcuff has one hand locked in a position where it cannot be used to manipulate that handcuff in any way. As a result, this design, requiring that two free hands act separately and simultaneously to unlock the handcuffs, makes it extremely unlikely an individual will be able to unlock the handcuffs even if he or she is in possession of a handcuff key, shim, or other lock picking device.

This disclosure provides numerous disparate designs which increase the security level of the handcuffs and make it extremely difficult for a wearer to remove the restraints even if he or she is in possession of a handcuff key. These different designs can be incorporated into handcuffs as a single enhancement or, in certain instances, multiple design concepts can be combined together to increase security of the handcuffs even further. A handcuff design according to the present teachings can incorporate any combination of features and capabilities discussed herein in a set of handcuffs or in any other similar restraint systems.

As used herein, various terms are employed and are intended to be used in the broadest sense possible. For example, the present application uses the term "officer" or "law enforcement officer" or otherwise to indicate the individual employing the handcuffs or similar restraints, and as such the term is meant to broadly encompass any individual who may have use for such a device or system, including but not limited to police officers, military personnel, corrections officers, security personnel, or other interested individuals.

Additionally, the design of the handcuffs may differ from the exact configuration(s) described herein. With respect to

restraints, the term "handcuffs" is intended broadly to mean any type of handcuffs, thumb cuffs, waist chains, leg irons and/or any other type of restraint designed to restrain a person's body part(s) to include but not limited to his or her hands, wrists, fingers, arms, legs, ankles, feet, waist, shoulders, neck or any other body part. These are collectively referred to henceforth as "handcuffs".

Further, certain designs and capabilities are described herein as being a single variation or capability while others are described as having multiple capabilities. It is understood that the invention is not limited solely to the configurations described but single or multiple configurations may be employed in a single restraint or handcuff respectively, as long as the functionality described is fully or in part incorporated. The foregoing and other concepts disclosed herein are intended to be interpreted broadly and not limit the scope of the present invention.

As used herein, the term "wearer" is synonymous with the term "suspect" or "individual" or any other similar term to convey someone to whom the handcuffs have been applied or a person whom the device is intended to restrain.

In the past, handcuff manufacturers have created handcuffs with different designs to enhance security. The predominant method has been to redesign the locking mechanism to use a more complicated and/or different key. Invariably, each system has been unsuccessful without significant acceptance or use. The requirement to utilize a "standard" universal handcuff key is critical from an operational effectiveness perspective. The use of a universal handcuff key enables peace officers, security officers and correctional officers to unlock handcuffs without having to identify which keys belong to which handcuff. Additionally, officers are thereby only required to carry one handcuff key, as opposed to multiple keys belonging to various disparate restraint systems.

Each of the variations described below utilize a traditional handcuff key, which is universally available and standardized. In certain instances, if desired, the handcuffs of the present design may employ specialized and proprietary key and locking systems to increase their effectiveness. Such handcuffs may also incorporate multiple design features discussed herein.

Each variation of the handcuff design herein incorporates the ability of the handcuffs to be "double locked", similar to a traditional handcuff, as an option to the officer or other law enforcement professional. The "double lock" feature enables the law enforcement officer to set a detent in the double lock bar of the handcuff preventing the single strand from ratcheting further between the double strands and tightening the handcuffs. A suspect wearing handcuffs that have not been double locked may inadvertently tighten the handcuffs leading to pain and discomfort. Worse, a suspect may intentionally attempt to tighten the handcuffs in order to facilitate some means of escape, or to persuade the law enforcement professional to loosen the cuffs or uncuff the suspect, thereby forcing a potential situation posing high risk and potentially high liability.

All drawings, schematics or other visual depictions in these designs encompass a set of handcuffs working in unison to secure one or more appendages of a wearer. In some drawings, only a single unconnected handcuff is depicted. A second handcuff is not depicted in some drawings for clarity and simplicity reasons. Actual designs will normally encompass at least two separate handcuffs connected via one or more of several available methods such as a metal chain, links, roller chain, clasps, hinges, solid bar or any other method. At least one, or in many cases, both of the individual cuffs employ the designs depicted herein.

A first variation of the present design is illustrated in FIG. **1**A. From FIG. **1**A, the handcuffs **100** may utilize a triple tab spring **101**. FIG. **1**B shows the triple tab spring **101** in detail, with three individual portions **102**A, **102**B, and **102**C on the upper part of triple tab spring **101**. Each of the three portions of the segmented triple tab spring **101** engage with three individual pawls positioned next to each other, shown as first lock bar button pawl **103**, lock bar key pawl **104**, and second lock bar button pawl **105**. The triple tab spring **101** exerts pressure upwards individually into each of the lock bar pawls which lock into ratchet teeth **110** of single strand bow **109**.

Also shown in FIG. **1**A are various handcuff components, including the universal handcuff key **106**, first double strand **107**, second double strand **108**, single strand bow **109**, bow track **110**, mid plate **111**, pawl pivot pin **112**, keyhole **117** and double lock bar **113** sitting within mid plate **114**.

Each of the outer lock bar pawls, first lock bar button pawl **103** and second lock bar button pawl **105**, has a button attached to the center outer portion of the outer bar pawl. First button **115** and second button **116** are shown on first lock bar button pawl **103** and second lock bar button pawl **105**, respectively. The buttons may be affixed to the outer bar pawls via any number of methods, including glue, welding, screws, pins, and so forth. In another iteration of the design, the lock bar pawl or pawls, such as lock bar key pawl **104**, may be manufactured with a button. In such a case, the pawl with incorporated button may be one solid piece of metal or other material thus providing rigidity and increased strength.

The outer lock bar pawls **103** and **105** in this embodiment incorporate a set of recessed/concaved pull down buttons **115** and **116** that require a two handed manipulation to release the cuffs. In this variation of the design, two button pawls **103** and **105** are added to traditional single key pawl **104**, all positioned on a triple tab spring **101**, requiring that all three pawls **103**, **104**, and **105** be disengaged simultaneously from the teeth **110** of the first strand **109** in order to release the handcuff.

A close view of the assembled version of handcuffs **100** is shown in FIG. **1**C. In this variation, two recessed pull down buttons, including button **115** in this view, located on either sides of the cuff connect to and thereby control the two outer button pawls, first lock bar button pawl **103** and second lock bar button pawl **105**, positioned above or on triple tab spring **101**, contained within the double strands of handcuffs **100**. Each recessed pull down button controls a single button pawl, such as first button **115** controlling first lock bar button pawl **103** in this view. When manually pulled or depressed toward the handcuff chain, teeth **118** of the button pawls are disengaged from teeth **110** of the single strand bow **109**. When each recessed pull down button, such as first button **115** and **116**, are pulled toward the chain linking the pair of handcuffs, the first lock bar button pawl **103** and second lock bar button pawl **105**, separately but simultaneously disengage from the teeth of the single strand.

This two handed operation then further requires that a traditional handcuff key **106** be inserted into the key hole **117** located on the double strand **107** using a different hand and turned, while simultaneously depressing the recessed pull down buttons **115** and **116** with the first hand to disengage the button pawls **103** and **105**, thereby disengaging the third of the three pawls, the key pawl **104**, from the single strand. Only when all three pawls **103**, **104**, and **105**

are simultaneously disengaged from the ratchet teeth **110** is the single strand bow **109** released and therefore able to open.

Due to the design of triple tab spring **101**, constant individual pressure is continuously applied by spring **101**, upwards into each of three individual pawls **103**, **104**, and **105**. If at any point, pressure is released from the handcuff key **106** or either of two buttons **115** and **116**, each of the pawls individually reengages ratchet teeth **110** thereby relocking the handcuffs and preventing them from being opened.

The requirement for two separate hands to be utilized to simultaneously manipulate the handcuff key **106** and both lock bar button pawls **115** and **116** makes it extremely difficult for the wearer of the handcuffs to free him or herself, even if he or she is in possession of a handcuff key **106**. This system increases the security features of the handcuffs, as it requires two separate but simultaneous actions, each requiring hands with opposable digits.

FIG. **1**D shows an alternate view of this embodiment with handcuff key **106** inserted but not turned, teeth **119** of key pawl **104** engaged with teeth **110** single strand bow **109**, and teeth **118** of first lock bar button pawl **103** disengaged from teeth **110**. FIG. **1**E shows handcuff key **106** turned, and both buttons including button **115** pulled/pushed downward in this view, enabling release of single strand bow **109**.

A second variation of the design is presented in FIG. **2**A. In this embodiment, two independent "side pawls" **201** and **202** are located on the outer edges of the handcuffs **200**. These side pawls **201** and **202** are controlled by buttons located at either end of first mid plate **203**, which sit perpendicular to the teeth **204** of the single strand **205** in such a way as engage with teeth **204** of single strand **205** to prevent movement of single strand **205** when in a locked position. These side pawls **201** and **202** act in a capacity similar to pawls located inside the handcuffs, such as is shown in the handcuffs **100** of FIG. **1**A, and are under spring pressure **210** and **211** forcing them upward into the single strand ratchet teeth **204**.

Also shown in FIG. **2**A are various cuff components, including first double strand **212**, second double strand **213**, single strand bow **218**, second mid plate **214**, pawl pivot pin **215**, double lock bar **216**, keyhole **217** located in the second double strand **213**, and single strand bow **218**. FIG. **2**B depicts teeth **208** of key pawl **209** engaged with the teeth **204** of single strand **205**. Additionally, teeth **201** and **202** of the side pawls are also engaged with teeth **204** of single strand **205**.

In this embodiment of the design, in order to disengage each side pawls **201** and **202** from teeth **204** of single strand **205**, each button **206** and **207** located on either end of mid plate **203** and **214**, separately and independently control a single side pawl **201** and **202** and must be pulled down or depressed simultaneously in order to release teeth **201** and **202** of the single side pawl(s) from teeth **204** of the single strand **205**. As a depicted in FIG. **2**C, a handcuff key, not shown in this view, must simultaneously be inserted in keyhole **217** and turned in order to disengage teeth **208** of key pawl **209**. Only when the teeth of each separate side pawl **201** and **202** and key pawl **209** are disengaged (separately and simultaneously) may the single strand **205** be released and the cuff therefore opened.

As shown in FIG. **2**D, this design maintains the traditional controls and functions of a handcuff while adding two additional pawls **201** and **202** and sliding buttons **206** and **207** on the sides of the handcuff. Side pawls **201** and **202** and associated respective buttons **206** and **207** may be manufactured in one piece to provide strength and rigidity or may be designed as separate components. The side pawls **201** and **202** are continuously pushed upwards under individual spring pressure from springs **210** and **211** located under the bodies of side pawls **201** and **202** as depicted in FIG. **2**B. The springs **210** and **211** reside in small holes or reliefs built into the side plates **214** and **203** along with the side button assemblies **206** and **207**.

The top of the side pawls **201** and **202**, where they engage the ratchet teeth **204**, may be provided such that the single strand **205** can only move in one direction, such as tightening, without the use of a handcuff key **217**. The handcuffs in such a configuration may only be opened or loosened if the key pawl **209** and the side pawls **201** and **202** are simultaneously disengaged from the single strand **205** teeth **204** as depicted in FIG. **2**C.

This two handed operation, requiring opposable digits on two different hands, makes it extraordinarily difficult if not impossible for the wearer of the handcuffs to open the handcuffs even with the use of a handcuff key. This is largely because one hand of the wearer of the handcuff is incapacitated by the handcuff leaving only one hand to manipulate the locking mechanism of the handcuff.

A third variation of the design is presented in FIG. **3**A. In this variation of the design, a sliding keyhole block button **301** is positioned on the double strand **302** next to and on the same side as the keyhole **303**. The sliding keyhole block button **301**, has a concave surface and fits inside an opening **312** in the first double strand **302**. The concave surface of the button **301** ensures the button **301** cannot be activated by side pressure on the outside of the double strand. As presented in FIG. **3**B, the outward appearance of the handcuff is consistent with the basic design configuration of most commercial handcuffs with the visible exception of sliding button **310** and related components. FIG. **3**B depicts the handcuff in its normal state whereby button **301** is held under spring pressure in proximity to keyhole **303**.

As depicted in FIG. **3**C, the sliding button **301** is held under pressure by a small spring **304**. The spring **304** provides positive pressure on the button **301** in a direction towards keyhole **303**. This provides a condition whereby the natural state of the sliding keyhole block button **301** is in the closed position thereby covering the keyhole **303** as shown in FIG. **3**B and FIG. **3**C. This configuration prevents a person from placing a universal handcuff key (not shown) inside the keyhole **303** unless sliding keyhole block button **301** and attached cover **305** have first been retracted.

The keyhole block button **301** includes a plate **305** acting in the capacity of a keyhole cover. The keyhole cover **305** and keyhole block button **301** may be designed as a one-piece design or two pieces bonded together to form a single unit.

This embodiment prevents access to the keyhole **303** located on double strand **302** of the handcuff, requiring that sliding keyhole block button **301** first be pulled in a direction away from the keyhole **303**, sliding open the door **305** and providing access to the keyhole **303** as depicted in FIG. **3**D. The sliding keyhole block button **301** would be contained within the double strand **302**, next to the keyhole **303**. As shown in FIG. **3**D, this design requires one hand to open the door **305** of sliding keyhole block button **301**, thereby exposing opening **303** for the insertion of the universal handcuff key (not shown in this view), and allowing for insertion and rotation of the key to disengage the teeth of the key pawl **306** from the teeth **307** of the single strand **308**, thereby opening the cuff. In a normal position, the keyhole **303** of the handcuff is blocked by door **305** controlled by the

sliding keyhole block button **301**, thereby preventing access to keyhole **303**. Also shown in FIG. **3**A are various handcuff components, including a second double strand **309** and two mid plates **310** and **311**.

This two handed operation, requiring opposable digits on two hands, would make it extremely difficult if not impossible to achieve by the wearer of the handcuff. This is largely because one hand of the wearer of the handcuff is incapacitated by the handcuff leaving only one hand to manipulate the locking mechanism of the handcuff. A fourth embodiment of the design is presented in FIG. **4**A. The standard handcuff is manufactured with a single strand **401** with (male) ratchet teeth **402** protruding on the outer edge of the single strand bow **425**. These ratchet teeth **402** engage with the teeth **422** of the key pawl(s) **403** in order to lock the handcuffs and allow the handcuffs to freely travel in only one direction (tighten) unless a handcuff key **416** is utilized to unlock them. In this embodiment, (female) ratchet indentations **404** are formed into the side edges of single strand bow **425** of single strand **401**. The indentations **404** may match the density and frequency of ratchet teeth **402** on single strand bow **425**. The outer ratchet teeth **402** are engaged by teeth **422** of the key pawl(s) **403** located in the center of the handcuffs whereby a spring **405** places constant upwards pressure on the key pawl **403** into outer ratchet teeth **402** of single strand **401**.

From FIG. **4**B, the ratchet (female) indentions **404** are located at opposing sides and ninety-degree angles along the outer edges of bow **425** of single strand **401**. Two squeeze buttons **406** and **407** are located on both sides of outer double strand **408** and **409** of the handcuffs and protrude through two holes **423** and **424** in the double strands **408** and **409**. These buttons **406** and **407** have a concave surface to prevent external pressure on the double strands **408** and **409** from inadvertently depressing them. On the back of these buttons **406** and **407** are small extensions **410** and **411** with a (male) ratchet **412** and **413** interface. The button(s) **406** and **407** are held in place by double strand housing **408** and **409** and a pin (not shown) or other type of fulcrum is used to provide the ability for this part to pivot back and forth (into and out from the handcuff).

The top of the button extension arms **410** and **411** interface using a small spring(s) **414** and **415**, providing positive pressure inward onto the outer edge of single strand ratchet **401** indentations **404** as depicted in FIG. **4**C. The shape of ratchet indentations **404** and corresponding button ratchet interface **412** and **413** mirror the style and concept as exhibited by teeth **402** of single strand ratchet **401**. This allows the handcuffs to freely move in one direction (tighten only) without the use of a key. A universal handcuff key **416** is required to unlock or reverse the direction of the moving single strand **401**.

A common handcuff lock picking technique employs a shim comprised of a thin piece of metal, plastic or other material pushed into rear channel **417** of the handcuffs between ratchet teeth **402** and the key pawl teeth **422**. This handcuff countermeasure is extremely effective and can rapidly unlock/open a pair of handcuffs without the use of a handcuff key **416**.

Defeating the present design may require the use of three simultaneous shims to open the handcuffs in the manner described above. The three shims would need to be simultaneously used on single strand ratchet teeth **402** and both sides of the single strands at ratchet indentions **404** of the bow **425** to open the handcuffs.

When the two squeeze buttons **406** and **407** are resting (not depressed), they engage with corresponding indentations **404** on the sides of the single strand **401** to prevent movement of the single strand **401** backwards which could loosen the handcuffs. The single strand **401** can still tighten without the use of a handcuff key **416**, a capability common with most handcuffs.

As depicted in FIG. **4**D, each squeeze button detent **406** and **407** is positioned on a pivot indentation **418** and **419** within the handcuff double strand(s) **408** and **409** so that when the button(s) **406** and **407** is/are squeezed, teeth **412** and **413** at the top of detent **418** and **419**, located between the single **401** and double strands **408** and **409**, are pressed against and engaged with side indentations **404** of single strand **401**. From FIG. **4**E, when buttons **406** and **407** are depressed, the attached extensions **410** and **411** pull away from indentations **404** in the single strand **401** thereby disengaging teeth **412** and **413**.

The two squeeze buttons **406** and **407** are separately and simultaneously squeezed to disengage from side indent **404** of the single strand **401**, while also inserting and rotating a handcuff key **416** in the keyhole **420** to disengage key pawl **403** from bottom teeth **402** of single strand **401** to allow for the release or uncuffing of single strand **401**.

This two handed operation, requiring opposable digits on two separate hands, would be difficult if not impossible for the wearer of the handcuff. This is largely because one hand of the wearer of the handcuff is incapacitated by the handcuff leaving only one hand to manipulate the locking mechanism of the handcuff. Additionally, the design of the ratchet indentations **404** on the outer edge of the single strand **401** prevents the use of a single shim to open the handcuff.

In another embodiment of the design, depicted in FIG. **5**A, the handcuffs are constructed in the traditional manner utilizing pawl(s) **501** and **502**, which engage the ratchet teeth **504** of single strand **503**. A chain tension lock bar **505** system controls a second (or third, etc.) pawl **502** which, when in a locked position, engages with teeth **504** of single strand **503**. In this variation of the design, the chain **506** linking the pair of handcuffs is connected to a swivel collar **507** that interfaces with a chain tension lock bar **505**, which controls the movement of a pawl **502** located within double strands **508** and **509** of the handcuff. The chain tension lock bar **505** connects secondary pawl **502** to handcuff chain **506**. The chain tension lock bar **505** moves up and down inside an indentation **521** inside double strand **509**.

As shown in FIG. **5**B, a small spring **510** provides constant positive tension on swivel chain collar **507**, forcing the system upwards into the handcuff towards the ratchet teeth **504** of single strand **503**. The chain tension lock bar **505** possesses an indentation **511** that interfaces with the swivel collar **507** connected to chain **506**.

The swivel collar **507** of chain **506**, under pressure from spring **510**, forces chain tension lock bar **505** upwards towards pawl **502**. The upper portion **512** of chain tension lock bar **505** is connected to key pawl **502** by any type of method to include welded, pinned as shown in arrangement **512**, bonded, glued, etc. The pressure exerted by spring **510** into collar swivel **507** is transferred into tension lock bar **505**, pushes pawl **502** upwards and engages teeth **504** of single strand **503**.

From FIG. **5**C, when the handcuff chain **506** is pulled away from the body of handcuff **507** and **509**, the connected pawl **502** is also pulled down, disengaging the teeth **513** of secondary pawl **502** from the teeth **504** of single strand **503**. In order to create a full release of single strand **503**, the teeth **514** of key pawl(s) **501** must also be disengaged through the simultaneous insertion and rotation of a handcuff key in keyhole **515** of the handcuff. Only when the teeth **513** of

secondary pawl **502** and the teeth **514** of key pawl **501** are simultaneously disengaged from the teeth **504** of single strand **503**, may the single strand **503** be released.

In this embodiment two or more pawls may be employed. One pawl **502** connects to swivel collar **507** so that the retraction of handcuff chain **506** from the handcuff double strand **508** and **509** retracts pawl **502** from teeth **504** of single strand **503**. This pawl **502** cannot be disengaged from teeth **504** of single strand **503** by use of a universal handcuff key. Also shown in FIG. **5**A are various cuff components, including the single strand bow **516**, tab spring **517**, first mid plate **518**, second mid plate **519** and double lock bar **520**.

This embodiment requires the wearer of the handcuffs to pull the two handcuffs apart to create pressure on the secondary chain tension pawl **502** while simultaneously turning a handcuff key to release the single strand **503**. This design makes it more difficult for the wearer of the handcuff to release himself or herself from the restraints even with the use of a handcuff key.

Handcuffs are generally constructed with two individual handcuff ratchets connected together via swivel collars and a small metal chain. This system allows the handcuffs to be folded over for transport and quickly deployed. Additionally, the metal chain links provide flexibility and allow movement of the wearer so that he may twist and move his hands even when handcuffed. This flexibility and movement allows for the wearer to be more comfortable, reduces injuries, and allows an officer to handcuff a person more easily as the handcuffs may be turned and twisted as needed.

This flexibility of the existing linked chain design provides a security weakness in the handcuffs. Due to the flexibility of the linked chain, a wearer may twist her hands and wrists in a manner in which he or she can now access the keyholes of the handcuffs he or she is wearing in an attempt to defeat the security mechanism. This flexibility allows the wearer to unlock the handcuffs he or she is wearing using a universal handcuff key or lock-picking device.

Another embodiment of the design is shown in FIG. **6**A. From FIG. **6**A, a small linked roller chain **601** allows only for forward and backward flexibility and does not allow for lateral movement. This allows for the handcuffs to be folded over for transport and quickly deployed similar to a standard pair handcuffs in the manner shown in FIG. **6**B.

The roller chain **601** is relatively rugged and linked openings **602** between the chain links **601** may be minimal to prevent the insertion of pry bars or tools. The roller chain **601** may be connected to each of the handcuff ends by a swivel collar **603** or other similar system. The roller chain **601** may be comprised of one or many links to provide greater flexibility and/or space between the two pair of handcuffs or a minimal amount of links in order to reduce the flexibility available to the wearer of the handcuffs.

The swivel **603** connects roller chain **601** to the handcuffs and has the ability to rotate freely and independently from each of the handcuffs in the manner shown in FIG. **6**C. This allows the handcuffs to be twisted by the wearer to increase comfort or to potentially attempt to manipulate the locking mechanism of the handcuffs. FIG. **6**C depicts the handcuff with the swivel collar **604** rotated at 45 degrees and without the double lock bar **608** engaged.

In this embodiment, collar **604** of swivel **603** sits inside the housing of double strand **605** and **606**. The collar **604** of swivel **603** has two opposing flat areas **607**. The double lock bar **608** sits directly above swivel collar **604**. When the handcuffs are double locked, the double lock bar **608** is moved laterally towards keyhole **614** which prevents pawls **609** from moving downward and effectively prevents single strand **610** from moving in any direction (tightening or loosening).

In this design, double lock bar **608** has two small tabs **611** extending downward into the area occupied by swivel collar **604**. When the handcuffs are not double locked, tabs **611** do not interface or interfere with the rotation of collar swivel **604**. When double lock bar **608** is moved into the double lock position, tabs **611** move forward and interface against the collar of swivel **604**.

When the flat areas **611** of collar swivel **604** are lined up as shown in FIG. **6**D, these tabs **611** move into position and sit solidly against the flat areas **607** of collar swivel **604** as represented in FIG. **6**E. This position now prevents the swivel collar **603** and **604** from rotating due to double lock bar tabs **611** resting firmly against the flat areas **607** of swivel collar **604**. In order to allow swivel collars **603** and **604** to rotate, the handcuffs first have to be taken out of the double lock position. This moves tabs **611** backward away from the flat areas **607** of the swivel collar **603** and **604** and allow them to rotate.

Locking swivel collars **603** and **604** into one position produces a condition whereby, the handcuffs can move or twist only in the direction which the roller chain **601** allows. This design would prevent a wearer from being able to twist the handcuffs in multiple positions when attempting to manipulate the locking system of the handcuffs. The locking bar tabs **611** are only able to move against flat surface **607** of swivel collar **603** and **604** when swivel collar component **604** is aligned with the locking block tabs **611** as shown in FIG. **6**F. Once tabs **611** interface with the flat areas of the swivel collar **607**, as in FIG. **6**G, the handcuffs can be double locked.

This embodiment also provides for a double lock pre-staging position for the tabs **611** as depicted in FIG. **6**H. In such a case, an officer could place the handcuffs on a wearer and then initiate the double lock capability. If the roller chain **601** of the handcuffs are twisted in such a manner that tabs **611** cannot move into position because the flat areas **607** of swivel collar **604** are turned, the officer may still engage the double locking system. In such a case, the double lock bar **608** moves forward, towards keyhole **614**, and double lock bar tabs **611** engage against the rounded area of handcuff swivel collar **604**. The movement of double lock bar **608** allows tab spring **612** to move from the unlocked "V" notch **613** into the upper double lock portion of the "V" notch **614** of double lock bar **608**. This position would prestage the tab spring **612** and provide positive pressure into double lock "V" channel **614** but would not be fully seated. Once swivel collar **604** turns enough so that the flat areas **607** of swivel collar **604** are in alignment, the double lock bar tabs **611** would then spring forward into position. This movement would be automated because of the positive pressure of tab spring **612** pushing down and forward into the "V" channel **614** of double lock bar **608**.

This sequence is depicted in FIG. **6**I where double lock bar **608** has been pre-staged and the spring **612** has been moved so that it is not fully seated in the "V" notch **614** of the double lock position. In FIG. **6**J tabs **611** are aligned with the flat areas **607** of swivel collar **604**. In FIG. **6**K the flat areas **607** are aligned allowing tabs **611** to move into the double lock position and fully seating tab spring **612** into the double lock "V" notch **614**. As a result, tabs **611** prevent swivel collar **604** from twisting due the flat areas **607** which are aligned against tabs **611**.

This embodiment allows an officer to place the handcuffs on the wearer in any position with the handcuffs freely

spinning and twisting as needed to facilitate the application of the device. Once the wearer is handcuffed, the officer may initiate the double lock mechanism of the handcuffs. If the handcuffs are aligned, this design limits the ability for roller chain **601** to swivel, thereby preventing the wearer from being able to twist his hands in order to access the keyhole **614** of the handcuffs. If the swivel collar **604** and tabs **611** are not aligned, the handcuffs revert to a double lock pre-stage condition. When the wearer turns their hands into a position which aligns the flat areas **607** of swivel collar **604** with tabs **611**, the handcuff double lock bar **608** would automatically move and lock into position. This process is automatic as a result of the spring pressure applied by tab spring **612** entering the double lock "V" channel **614**. Also shown in FIG. **6**A are various handcuff components, including single strand ratchet teeth **614**, pawl teeth **615**, single strand bow **616**, first mid plate **617** and second mid plate **618**.

In another embodiment shown in FIG. **7**A, two key blocking squeeze buttons **701** and **702** prevent the free rotation of a universal handcuff key **712** when inserted into the keyhole **703**. The two key blocking squeeze buttons **701** and **702** are located on the outside of each double strand **704** and **705**. The key blocking squeeze buttons **701** and **702** are comprised of a button portion, which is located on the outside of the double strand **704** and **705**, and are connected via a spring **706** which is contained within and between the double strands **704** and **705** of the cuff as shown in FIG. **7**B. Each key blocking squeeze button **701** and **702** has an individual blocking tab **707** and **708**, similar to a bit in a key and shown in FIG. **7**C. The blocking tab, such as individual blocking tabs **707** and **708**, on the end of the key blocking squeeze buttons **701** and **702** are contained between the double strands **704** and **705** and block the rotation of the handcuff key in the keyhole **703** as shown in FIG. **7**D.

When in a blocking position, the blocking tab mechanisms **707** and **708** on the key blocking squeeze buttons **701** and **702** prevent full rotation of the handcuff key **712** in keyhole **703**, preventing the disengagement of key pawl **709** from teeth **710** of single strand **711**. Release requires a user pressing the two key blocking squeeze buttons **701** and **702** simultaneously inwards on spring **706**, towards each other, in order to push blocking tab mechanisms **707** and **708** towards the inside walls of double strands **704** and **705** as shown in FIG. **7**E. As a result, this creates a space in which the handcuff key **712** can freely rotate and depress key pawl **709**, thereby disengaging teeth **710** of single strand **711** and allowing the handcuff to open as depicted in FIG. **7**F. Also shown in FIG. **7**A are various cuff components, including the double lock bar **713**, first mid plate **714**, second mid plate **715** and tab spring **716**.

Another version of the design, may comprise a double lock with a plunger, i.e. passive inertia inhibitor, as presented in FIG. **8**A. The standard double lock bar **801** system in use for handcuffs is designed to move into position to prevent pawls **802** from moving downward, thereby locking the handcuffs from opening or becoming tighter. As discussed, the double lock bar **801** is manipulated through the use of a universal handcuff key **812** and normally has two positions identified as "double locked" or "not double locked". The double lock bar **801** is held in position due to positive pressure which is being applied by tab spring **803** in a double locked "V" notch **804** or unlocked "V" notch **818** located on top of double lock bar **801**. If a double locked handcuff is struck against a hard surface in a specific manner, inertia may move the double lock bar **801** laterally into a position where the handcuffs are no longer in double locked mode. Striking the handcuffs against a hard surface to dislodge the double lock mechanism **801** is a common tactic used by wearers to unlock the double lock bar system currently in use.

From FIG. **8**A, double lock bar **801** has a hole **805** in the top portion of the double lock bar **801** near the end closest to the keyhole **806** of the handcuff. As seen in FIG. **8**B, a two-piece plunger **807** and **808** is located inside this hole, shown at points **805** and **811**, with a spring **809** providing positive pressure upwards from the bottom of mid plate **810**. When double lock bar **801** is in the double lock position, the two piece plunger **807** and **808** moves upwards so that the upper portion of the plunger **807** protrudes into keyhole chamber **806** of the handcuffs located within double strand **810**. The second piece of plunger **808**, located under the upper plunger **807**, moves upwards from inside the channel **811** in the bottom of mid plate **810**. From FIG. **8**C, this upward movement creates a condition whereby the lower plunger cylinder **808** simultaneously engages mid plate **810** and double lock bar **801** in the double lock position thereby preventing double lock bar **801** from moving laterally.

In order for double lock bar **801** to move, plunger **807** and **808** should be depressed or moved downward so that the cylinder of lower plunger **808** moves downward against spring **811**. This movement ensures the bottom of the upper plunger **807** and top of the lower plunger **808** are aligned in position where they allow free movement of double lock bar **801**.

From FIG. **8**D, this embodiment allows for a universal handcuff key **812** to be placed into handcuff keyhole **806**. The handcuff key **812** presses against the rounded or angled upper portion of the upper plunger **807** thereby depressing the plunger **807** and **808** as handcuff key **812** enters the keyhole channel **806** as seen in FIG. **8**E.

From FIG. **8**F, when double lock bar **801** is moved laterally with a rotating handcuff key **812** into an unlocked position, double lock bar **801** moves with the upper plunger **807** still inside. The lower plunger **808** with spring **809** remains depressed within channel **811** inside mid plate **810** located under double lock bar **801**. From FIG. **8**G, the bottom of double lock bar **801** covers channel **811** thereby depressing the top of lower plunger cylinder **808** and keeping it in place under spring **809** pressure. An alternate representation of the two piece design of plunger **807** and **808** is shown in FIG. **8**H.

The double lock bar **801** may be held in the unlocked "V" notch **818** or double locked "V" notch **804** position by pressure exerted by tab spring **803**. Also shown in FIG. **8**A are various cuff components, including the first double strand **813**, second mid plate **814**, single strand **815** and second double strand **816**.

A further embodiment of the present design is a double lock with hook or passive momentum inhibitor design. From FIG. **9**A, a hook shaped component **907** is located adjacent to the handcuff keyhole **908** and pinned into position at the elbow of the hook shaped component **907**. This hook shaped component **907** has a small spring **909** that provides positive pressure upwards into the double lock bar **901** against the bottom of mid plate **910**. As seen in FIG. **9**B, when the handcuffs are placed in a double lock configuration, the hook shaped component **907** moves upwards and engages into a notch **911** located underneath double lock bar **901**. This position effectively locks double lock bar **901** into the double locked position as hook shaped component **907** is positively engaged in double lock bar notch **911** to prevent lateral movement.

As shown in FIG. **9**C, when a universal handcuff key **903** is placed in handcuff keyhole **908** and key **903** is rotated to release the double lock mechanism, the bit of handcuff key **908** engages and depresses the hook shaped component **907** first. This engagement forces the hook shaped component **907** downward so that it disengages from double lock bar notch **911**. The handcuff key **903** then continues to rotate into double lock bar **901** thereby pushing it laterally out of the double lock position as seen in FIG. **9**D. The handcuffs can then be normally unlocked via the handcuff key **908** which depresses the pawls **902** from the ratchet teeth **913** of single strand **912**.

When the handcuffs are not in the double lock position, hook shaped bar **907** sits along the bottom of double lock bar **901**. When double lock bar **901** moves into the double lock bar position, the hook shaped component **907** engages into a notch **911** located in the bottom of double lock bar **901**. This design prevents the double lock mechanism from being moved out of the double lock position unless a handcuff key **903** is placed into handcuff keyhole **908** and turned in order to double lock the system. Also shown in FIG. **9**A are various cuff components, including the first double strand **914**, second double strand **915**, single strand bow **916**, second mid plate **917**.

A further embodiment of the present design is shown in FIG. **10**A and encompasses a double lock with squeeze buttons on both sides (termed herein a Level **2** action). In this embodiment, two buttons **1001** and **1002** are located on the outside of the double strand **1003** and **1004** centered and on opposing sides of the handcuffs. The buttons **1001** and **1002** are concave and recessed from the exterior of the handcuffs to prevent inadvertently depressing and activating these buttons, although they can be accessed and manipulated via two holes **1012** and **1013** in the double strands **1003** and **1004**.

From FIG. **10**B, buttons **1001** and **1002** have small extensions with an L shape at the end, shown as L shaped pieces **1005** and **1006**. Small springs **1014** and **1015** behind the button faces **1001** and **1002** provide positive pressure outwards from the handcuffs. The L shaped pieces **1005** and **1006** interface with a notch **1008** in the double lock bar **1009** whenever the double lock is engaged, shown in FIG. **10**C. When the double lock bar is not engaged, L shaped notches **1005** and **1006** interface with unlocked notches **1007** in double lock bar **1009**.

All four notches **1007** and **1008** on both sides of double lock bar **1009** are sculpted to allow for double lock bar **1009** to be moved into the double lock position only without the use of buttons **1001** and **1002**. Notches **1007** and **1008** are additionally sculpted so that buttons **1001** and **1002** need to be depressed and the handcuff key **1017** used in order to take the handcuffs out of the double locked position.

This design allows the handcuffs to be double locked and prevents inertia from dislodging double lock bar **1009** thereby unlocking the double lock system. Again, striking handcuffs in order to deactivate the double lock system is a lock picking technique commonly used by suspects.

From FIG. **10**D, buttons **1001** and **1002** may be depressed, compressing springs **1014** and **1015** and moving L shaped pieces **1005** and **1006** out of double lock bar notches **1007** and **1008**. When the handcuffs are not in the double lock configuration, L shaped pieces **1005** and **1006** of buttons **1001** and **1002** interface with secondary notch or notches **1007** in double lock bar **1009**. As shown in FIG. **10**E, these secondary notches **1007** are sculpted to allow movement of the double lock bar **1009** even if the two buttons **1001** and **1002** are not depressed. This will allow an officer to double lock the handcuffs simply by engaging the double lock mechanism **1009** with a universal handcuff key **1017**. In such a case, L shaped pieces **1005** and **1006** allow double lock bar **1009** to move into the double lock position. Once the handcuffs are double locked, L shaped pieces **1005** and **1006** automatically enter the primary notches **1008** of double lock bar **1009**. FIG. **10**F depicts the position of the springs **1014** and **1015** in reference to the buttons **1001** and **1002**. Also shown in FIG. **10**A are various handcuff components, including ratchet teeth **1010**, single strand **1011** and mid plate **1016**.

A further embodiment of the present design is shown in FIG. **11** and includes a double lock with slider buttons on both sides (again a Level **2** action). In this embodiment, two buttons **1101** and **1102** are centered on the handcuffs and protrude through two holes **1115** and **1116** located on the outside of double strands **1103** and **1104**. Buttons **1101** and **1102** are concave and recessed from the exterior of the handcuffs to prevent inadvertently depressing or moving buttons **1101** and **1102**.

Buttons **1101** and **1102** have small extensions with L shape components **1105** and **1106** at the end. Small springs **1107** and **1108** sit underneath L shaped components **1105** and **1106** providing positive pressure upwards into double lock bar **1109**. When the handcuffs do not have double lock mechanism **1109** activated, L shaped components **1105** and **1106** sit under double lock bar **1109** in channels **1110** and **1111** with small springs **1107** and **1108** under pressure as shown in FIG. **11**B. Additionally, FIG. **11**C shows the spring **1108** depressed and exerting pressure upwards into double lock bar **1109**.

From FIG. **11**D, when double lock mechanism **1109** is engaged, L shaped components **1105** and **1106** interface with notches **1112** and **1113** underneath double lock bar **1109**. As shown in FIG. **11**E, this engagement prevents double lock bar **1109** from moving out of the double lock position unless both buttons **1101** and **1102** are pulled downwards and the handcuff key **1114** is simultaneously used to unlock the double lock mechanism **1109**. FIG. **11**F shows the rear of double strand **1104** plate with the rear of button **1102**, where the spring **1108** has pushed the button **1102** and L shaped component **1106** upwards. Also shown in FIG. **11**A are various handcuff components, including the keyhole **1117**, first mid plate **1118**, second mid plate **1119**, pawl(s) **1120**, single strand **1121** and ratchet teeth **1122**.

A further embodiment of the present design is a sliding keyhole blocking plate embodiment (opposite side of keyhole). Shown in FIG. **12**A is a sliding keyhole block button **1201** positioned on double strand **1202** opposite keyhole **1203** on the handcuff. The sliding keyhole block button **1201** is recessed into double strand **1202** with a concave surface to prevent inadvertent activation, where an alternate view is shown in FIG. **12**B. The concave button **1201** surface ensures the button cannot be activated by side pressure on the double strand **1202** and **1207** unless the button is physically pushed in a direction away from keyhole **1203**. The sliding keyhole block button **1201** is attached to a keyhole block cover **1204**. When at rest (no pressure applied), the sliding cover **1204** blocks keyhole **1203** from a handcuff key **1205** being inserted such as is shown in FIG. **12**C. In this embodiment, the sliding keyhole block button **1201** on double strand **1202** opposite keyhole **1203** makes it difficult for a person to simultaneously slide keyhole plate button **1201** and manipulate a handcuff key **1205** with the same hand.

FIG. **12**D shows the sliding button **1201** in the rest position (with no pressure exerted), where spring **1206**

exerts pressure on button cover **1204** to close the cover. In FIG. **12**E, button **1201** has been retraced thereby exposing handcuff keyhole **1203** on the opposite of the handcuff. FIG. **12**F depicts the shape of the sliding button **1201** and connected keyhole cover plate **1204** and the interface with double strand **1202**. FIG. **12**G shows keyhole block button **1201** with corresponding spring **1206** in double strand **1202** and spring **1206** exerting pressure on sliding block button **1201**. As a result, the handcuff key **1205** has an inability to be fully inserted into the handcuff locking mechanism and therefore cannot be used to unlock the handcuff. Also shown in FIG. **12**A are various handcuff components, including the second double strand **1207**, single strand **1208**, ratchet teeth **1209** and the mid plate **1210**.

A further embodiment provides a sliding block system preventing full entry of a handcuff key into a keyhole located on the double strand of a handcuff. From FIG. **13**A, a sliding keyhole protrusion button **1301** is connected to an L shaped block mechanism. From FIG. **13**B, button **1301** can be retracted in a direction away from keyhole **1303** thereby moving the block **1305** out of keyhole **1303** as shown in FIG. **13**C.

Sliding keyhole block button **1301** is recessed into double strand **1302** with a concave surface. The concave button surface ensures button **1301** cannot be activated by side pressure on the double strand **1302** unless button **1301** is physically pushed away from keyhole **1303**. From FIG. **13**D, this allows a handcuff key **1304** inserted into the keyhole in order to manipulate the locking mechanism. In this case, the block **1305** has been slid laterally in order to allow a handcuff key **1304** to enter the mechanism. A spring **1306** exerts pressure on the button **1301** from the double strand **1302**.

In this embodiment, the sliding keyhole plate button **1301** on double strand **1302** opposite keyhole **1303** makes it difficult for a person to simultaneously slide the keyhole plate button **1301** and manipulate a handcuff key **1304** with the same hand.

From FIG. **13**E, sliding block button **1301** is constructed in a manner in which a small metal protrusion **1305** slides into keyhole area **1303**. This forms a block inside the keyhole area **1303** to prevent the handcuff key **1304** from being fully inserted into keyhole **1303** unless button **1301** is first retracted. As a result, handcuff key **1304** cannot be turned in order to engage the locking mechanism of the handcuff. FIG. **13**F shows button **1301** retraced, opening handcuff keyhole **1303** on the opposite of the handcuff. FIG. **13**G shows the shape of sliding button **1301** and connected keyhole block **1304**. Also shown in FIG. **13**A are various handcuff components, including the single strand **1307**, first mid plate **1308**, second mid plate **1309**, second double strand **1310** and double lock bar **1311**

A further embodiment includes push button locks for a locking bar and is shown in FIG. **14**A. This push button locking arrangement provides for an enhanced double locking capability. Two sets of hands are required to disable the double locking mechanism. Two buttons **1401** and **1402** are positioned on either side of the double strands **1403** and **1404**. The buttons are separated by spring **1405**. Each of the buttons have L shaped protrusions **1406** and **1407** that interact with the double lock bar **1408** on the opposite side of each button **1401** and **1402**.

FIG. **14**B illustrates the double lock bar **1408** in an unlocked position. The buttons **1401** and **1402** have been depressed and the L shaped protrusions **1406** and **1407** are positioned against the sides of the double lock bar **1408**. In FIG. **14**B, the sides of the double lock bar **1408** has notches **1409** and **1410** which are not employed. FIG. **14**C shows the double lock on the handcuffs has been activated and slid forward towards keyhole **1411**. Buttons **1401** and **1402** have not been depressed and L shaped protrusions **1406** and **1407** have aligned with the double lock bar notches **1409** and **1410**. FIG. **14**D represents a close view of this alignment with the double lock bar notches **1409** and **1410**.

FIG. **14**E shows the L shaped protrusions **1406** and **1047** in the double lock bar notches **1409** and **1410**. The L shaped protrusions **1406** and **1407** are driven into notches **1409** and **1410** due to the pressure exerted by spring **1405**. The double lock bar **1408** is firmly locked into place and can no longer be dislodged by force or inertia.

In order for the double locking system to be unlocked, both buttons **1401** and **1402** must simultaneously be depressed to remove L shaped protrusions **1406** and **1407** from the notches **1409** and **1410**. Only then can handcuff key **1411** or a similar device be used to unlock double lock mechanism **1408** of the handcuffs. The need to depress buttons **1401** and **1402** and manipulate a handcuff key **1411** simultaneously makes it extremely unlikely that a person wearing the handcuffs will be able to unlock the double lock **1408** without assistance.

FIG. **14**F shows buttons **1401** and **1402** in a locked position as if they were seated within notches **1409** and **1410** and buttons **1401** and **1402** had not been depressed. FIG. **14**G illustrates buttons **1401** and **1402** as if they have been depressed, compressing spring **1405** and thereby moving the L shaped protrusions **1406** and **1407** out of notches **1409** and **1410**. FIG. **14**H depicts the buttons **1401** and **1402**, spring **1405** and corresponding L shaped protrusions **1406** and **1407**. Also shown in FIG. **14**A are various handcuff components, including keyhole **1412**, first mid plate **1413**, second mid plate **1414**, pawls **1415**, single strand **1416** and ratchet teeth **1417**.

Thus the present design comprises a handcuff or restraining system design which may require more than one hand to manipulate an aspect of the handcuffs while simultaneously turning a handcuff key. Alternately, the design may be one where the wearer of the handcuffs will have an inability to utilize two hands to manipulate the handcuffs in conjunction with the use of a handcuff key, or may incorporate two sliding buttons on opposing sides of double strands connected to two of three pawls. Sliding the buttons down independently unlocks two pawls while a third is unlocked with a handcuff key.

The design may alternately incorporate two sliding buttons on opposing edges of the double strand housing. The buttons engage pawls located at the edge, which interface with the single strand ratchet teeth. Sliding the buttons down independently unlocks the pawls while a central pawl is unlocked with a handcuff key. A further alternative comprises a design where a sliding button plate, under spring tension, blocks the keyhole. The button, located on the same side as the keyhole, can be retracted and a key inserted in the keyhole to unlock the handcuffs.

Thus the present arrangement may include a design where ratchet indentations are located on the side edges of the single strand, side pawls engage the side ratchets, and tension is released when two buttons on the double strands are simultaneously depressed.

Designs presented herein include a design whereby the handcuff swivel collar interfaces with one of multiple pawls where the handcuff chain has to be pulled away from the handcuff to disengage the pawl and key simultaneously used to unlock the handcuffs; a design where a roller chain is used to connect the two handcuffs where the double lock bar has

two tabs which interface against the flat areas of a collar swivel thereby prevent the handcuffs from turning when double locked; a design where two buttons on the double strands need to be simultaneously depressed in order to allow a handcuff key to open the locking mechanism; a design where a double plunger system is incorporated into the double lock bar and when the handcuffs are double locked, the plunger prevents inertia strikes from unlocking the double lock bar; a design whereby an L shaped component is incorporated to engage into the double lock bar such that when the handcuffs are double locked, the L shape component prevents inertia strikes from unlocking the double lock bar; a design where two buttons on opposite sides of the double strand interface with the double lock bar when activated, wherein the buttons are depressed to allow the double lock bar to move when the key is turned.

Further embodiments of the present design include two buttons in opposite sides of the double strand interface with the double lock bar when activated where the buttons slide up or down to allow the double lock bar to move when a key is turned; a design where a sliding button plate, under spring tension, blocks the keyhole where the button, located on the opposite side as the keyhole, can be retracted and a key inserted in the keyhole to unlock the handcuffs; and a design where a slide plate moves a block into the keyhole, and the sliding plate needs to be retracted before handcuff key can fully seat into the keyhole in order to unlock the handcuffs.

According to one embodiment, there is provided a set of handcuffs comprising a handcuff strand comprising ratchet teeth, a universal handcuff key locking mechanism configured to receive a universal handcuff key to unlock the handcuffs, and locking means provided on one handcuff of the set of handcuffs requiring more than one hand to manipulate in addition to employing the universal handcuff key to release the ratchet teeth and unlock the set of handcuffs. Locking means may comprise a variety of arrangements, including but not limited to a multiple tab spring, a sliding mechanism, a design wherein the handcuff strand comprises a plurality of openings configured to receive teeth engageable by depressing a plurality of buttons, a chain tension lock bar, a multiple element spring and a multiple element key pawl, a double lock chain hinge, a two button arrangement comprising a spring positioned between two buttons, a double lock and spring-plunger arrangement, a hook component configured to engage a key pawl to keep the key pawl from moving, an opposing two button arrangement configured to lock and release a key pawl, a double lock with sliders on both sides of one handcuff or any other embodiments of similar designs.

According to a further embodiment, there is provided a restraining arrangement comprising a releasable strand comprising ratchet teeth, the releasable strand configured to tighten and loosen about a wearer, a universal key locking mechanism configured to receive a universal key to unlock the restraining arrangement, and locking means provided in the restraining arrangement requiring more than one hand to manipulate in addition to employing the universal handcuff key to release the ratchet teeth and unlock the restraining device from the wearer.

According to a third embodiment of the present design, there is provided a set of handcuffs comprising a releasable handcuff strand comprising ratchet teeth, the releasable handcuff strand configured to tighten and loosen about a wearer, a universal key locking mechanism configured to receive a universal key to unlock the set of handcuffs, and locking means provided on a single handcuff of the set of handcuffs, the locking means requiring more than one hand to manipulate in addition to employing the universal key to release the ratchet teeth and releasable handcuff strand and unlock the restraining device from the wearer.

The previous description of the disclosure is provided to enable any person skilled in the art to make or use the disclosure. Various modifications to the disclosure will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other variations without departing from the scope of the disclosure. Thus, the disclosure is not intended to be limited to the examples and designs described herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

What is claimed is:

**1**. A set of handcuffs comprising:

a handcuff strand comprising ratchet teeth;

a universal handcuff key locking mechanism configured to receive a universal handcuff key to unlock one handcuff of the set of handcuffs; and

locking means provided on one handcuff of the set of handcuffs requiring more than one hand to manipulate in addition to employing the universal handcuff key to release the ratchet teeth and unlock one handcuff of the set of handcuffs;

wherein the locking means comprise a multiple element pawl, wherein every element of the multiple element pawl rotates about a common axis and at least one element of the multiple element pawl is engaged by the universal handcuff key and each remaining element of the multiple element pawl is engaged by manipulation by a person.

**2**. The set of handcuffs of claim **1**, wherein the locking means further comprise a multiple tab spring.

**3**. The set of handcuffs of claim **2**, wherein the multiple element pawl is further configured to interface with the multiple tab spring.

**4**. The set of handcuffs of claim **1**, wherein the locking means comprises a sliding mechanism.

**5**. The set of handcuffs of claim **1**, wherein the multiple element pawl is further configured to receive the ratchet teeth and is engageable by depressing a plurality of buttons.

**6**. The set of handcuffs of claim **1**, wherein the locking mechanism comprises a chain tension lock bar.

**7**. The set of handcuffs of claim **6**, further comprising a multiple element spring and a multiple element key pawl.

**8**. The set of handcuffs of claim **1**, wherein the locking mechanism comprises a double lock chain hinge.

**9**. The set of handcuffs of claim **8**, further comprising a multiple element spring and a multiple element key pawl.

**10**. The set of handcuffs of claim **1**, wherein the locking means further comprise a two button arrangement comprising a spring positioned between two buttons.

**11**. The set of handcuffs of claim **1**, wherein the locking mechanism comprises a double lock and spring-plunger arrangement.

**12**. The set of handcuffs of claim **1**, wherein the locking mechanism comprises a hook component configured to engage a key pawl to keep the key pawl from moving.

**13**. The set of handcuffs of claim **1**, wherein the locking means further comprise an opposing two button arrangement configured to lock and release elements of the multiple element key pawl.

**14**. The set of handcuffs of claim **1**, wherein the locking means further comprise a double lock with sliders on both sides of one handcuff.

15. A restraining arrangement comprising:

a releasable strand comprising ratchet teeth, the releasable strand configured to tighten and loosen about a wearer;

a universal key locking mechanism configured to receive a universal key to unlock the restraining arrangement; and

locking means provided in the restraining arrangement requiring more than one hand to manipulate in addition to employing the universal key to release the ratchet teeth and unlock the restraining device from the wearer;

wherein the locking means comprise a multiple element pawl, wherein every element of the multiple element pawl rotates about a common axis and at least one element of the multiple element pawl is engaged by the universal key and each remaining element of the multiple element pawl is engaged by manipulation by a person.

16. The restraining arrangement of claim 15, wherein the locking means further comprise a multiple tab spring.

17. The restraining arrangement of claim 16, wherein the multiple element pawl is further configured to interface with the multiple tab spring.

18. The restraining arrangement of claim 15, wherein the locking means comprises a sliding mechanism.

19. The restraining arrangement of claim 15, wherein the strand comprises a multiple element pawl is further configured to receive the ratchet teeth and is engageable by depressing a plurality of buttons.

20. The restraining arrangement of claim 15, wherein the locking mechanism comprises a chain tension lock bar.

21. The restraining arrangement of claim 15, further comprising a multiple element spring and a multiple element key pawl.

22. The restraining arrangement of claim 15, wherein the locking mechanism comprises a double lock chain hinge.

23. The restraining arrangement of claim 22, further comprising a multiple element spring and a multiple element key pawl.

24. The restraining arrangement of claim 15, wherein the locking means further comprise a two button arrangement comprising a spring positioned between two buttons.

25. The restraining arrangement of claim 15, wherein the locking mechanism comprises a double lock and spring-plunger arrangement.

26. The restraining arrangement of claim 15, wherein the locking mechanism comprises a hook component configured to engage a key pawl to keep the key pawl from moving.

27. The restraining arrangement of claim 15, wherein the locking means further comprise an opposing two button arrangement configured to lock and release elements of the multiple element key pawl.

28. The restraining arrangement of claim 15, wherein the locking means further comprise a double lock with sliders on both sides of one handcuff.

29. A set of handcuffs comprising:

a releasable handcuff strand comprising ratchet teeth, the releasable handcuff strand configured to tighten and loosen about a wearer;

a universal key locking mechanism configured to receive a universal key to unlock a single handcuff of the set of handcuffs; and

locking means provided on the single handcuff of the set of handcuffs, the locking means requiring more than one hand to manipulate in addition to employing the universal key to release the ratchet teeth and releasable handcuff strand and unlock the single handcuff of the set of handcuffs from the wearer;

wherein the locking means comprise a multiple element pawl, wherein every element of the multiple element pawl rotates about a common axis and at least one element of the multiple element pawl is engaged by the universal key and each remaining element of the multiple element pawl is engaged by manipulation by a person.

30. The restraining arrangement of claim 29, wherein the locking means further comprise a multiple tab spring.

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